Report of the Committee on Transportation and Parking in Support of Science

July 2015

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Abbreviations

ALD: Associated Laboratory Director

ADP: adjusted daily population

BSO: Berkeley Site Office

CRT: Computational Research and Theory facility

EV: electric vehicle

G&A: general and administrative

GSA: Government Services Administration

GPL: General Purpose Laboratory

GSRA: Graduate Student Research Assistant

IGB: Integrative Genomics Building

IBEW: International Brotherhood of Electrical Workers

LPR: license plate recognition

LSEV: low speed electric vehicle

LMO: Laboratory Management Office

LRDP: Long Range development Plan

NERSC: National Energy Research Scientific Computing Center

OCFO: Office of the Chief Financial Officer

PNNL: Pacific Northwest National Laboratory

RFID: radio frequency identification

SERC: Solar Energy Research Center

TDM: Transportation Demand Management

UC: University of California

UCLA: University of California Los Angeles

VAF: vehicle access fee

WSEC: Women's Scientist and Engineer's Council

1 INTRODUCTION

In June 2014, the Berkeley Lab Director convened a committee to investigate and recommend integrated transportation and parking solutions for the Berkeley Lab main site (the Lab). This report presents the activities of this Committee on Transportation and Parking in Support of Science from June 2014 through June 2015 and its recommendations. This report is organized as follows:

- Overview: A high-level summary of the current transportation and parking situation at the Berkeley Lab main site.
- Current Conditions: A detailed list of conditions that describe transportation and parking at the main site. These conditions were prepared based on a series of eleven presentations to the committee by subject matter experts (both internal and external to the committee) and additional research by committee members.
- Challenges: A high-level synthesis of key challenges facing transportation and parking at the main site. These challenges summarize the current conditions and express the range of issues to be addressed through recommendations.
- Funding Approaches: A brief review of the potential approaches to fund transportation and parking activities.
- Solution Space: A list of measures identified by the committee with the potential to increase parking availability, reduce parking demand, or decrease greenhouse gas emissions associated with commute transportation. This list represents the range of options considered to inform a more targeted set of recommendations.
- Recommendations: Specific steps recommended by the committee for Berkeley Lab to address transportation and parking needs at the main site.

Attachments include:

A. Committee Membership List: A list of members for the Committee on Transportation and Parking in Support of Science
B. Berkeley Lab Map: A map and building key for Berkeley Lab
C. Increases in Demand for Parking: A list of planned increases in demand for parking over the next fifteen years associated with building construction and demolition projects and projected growth under the 2006 Berkeley Lab Long Range Development Plan (LRDP)
D. Cost and Greenhouse Gas Models: Assumptions used to derive indicative costs for a parking garage and shuttle services, and to estimate greenhouse gas emissions associated with each
E. Neighborhood Parking Inventory: A summary of available parking spaces by parking permit category compared to the full-time equivalent commuters to the main site per building grouped by parking neighborhood, as of March 2015
F. Commute Clusters for the Main Site: Clustered counts (based on home location) of full-time equivalent commuters to the main site
G. Offsite Parking Options: A summary of a preliminary study on offsite parking options.

Please contact the committee co-chairs (Diana Attia, dmattia@lbl.gov and John Elliott, jdelliott@lbl.gov) with questions or corrections to any information contained in this report. Also, please note that the committee does not have operational responsibility for transportation and parking at Berkeley Lab. The committee activities were limited to development of recommendations only.

2 OVERVIEW

The Lab's ability to realize its scientific vision, which emphasizes consolidation and growth of scientific programs at the main site, could be significantly limited by the availability of parking using current approaches. In the immediate term, parking will be impacted by the occupancy of the General Purpose Laboratory and Solar Energy Research Center in early summer 2015 (70 staff added from offsite leased spaces), with continued pressure to parking introduced by the occupancy of the Computational Research and Theory (CRT) facility in summer to fall 2015 (124 staff added from offsite leased spaces), the planned start of Integrative Genomics Building (IGB) construction in early 2018 (100 parking spaces removed), and the planned occupancy of IGB in early 2020 (200 staff added from offsite leased spaces). Additional detail regarding increases in demand for parking associated with planned new construction and demolition projects on the main site is included as Attachment C.

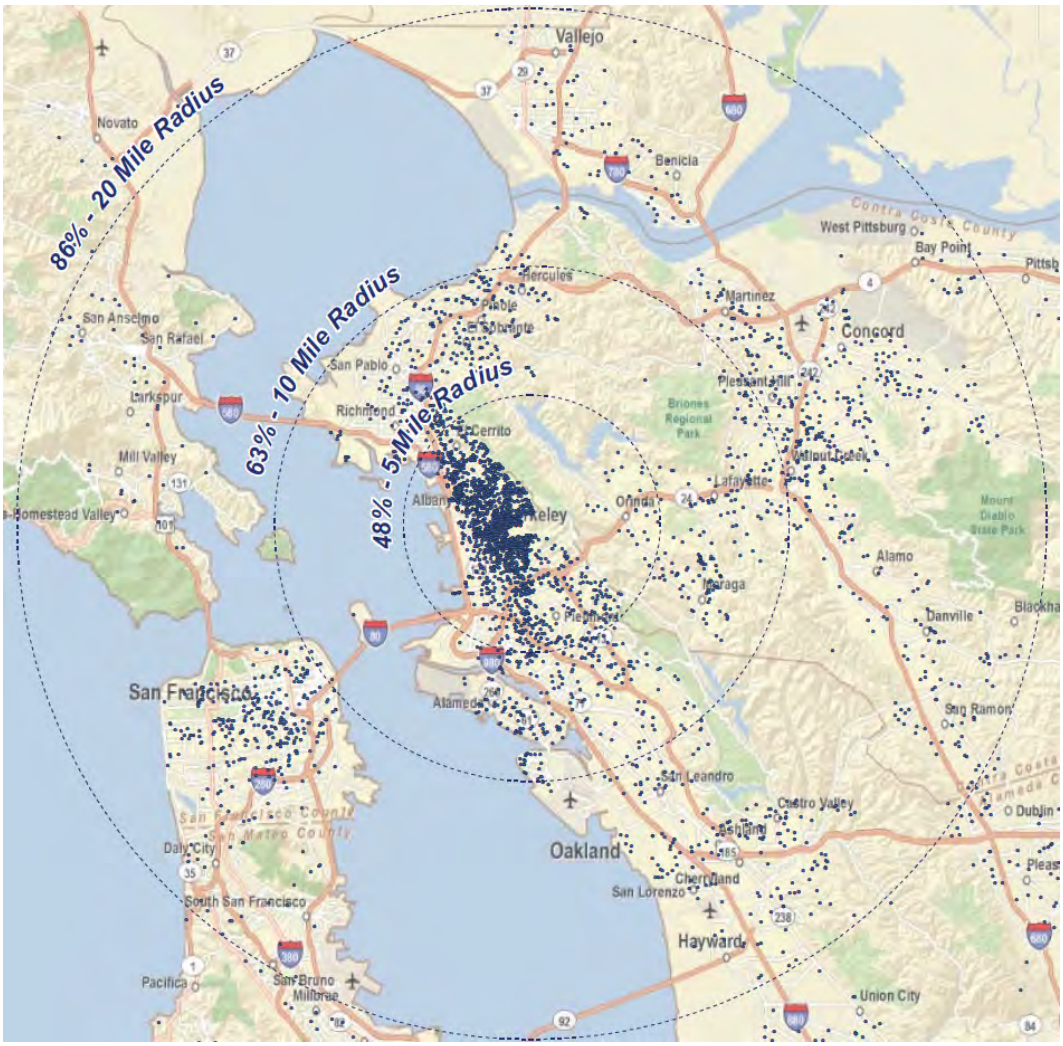
In the longer term, anticipated and envisioned growth of the Laboratory's scientific program and construction of additional buildings over the next ten years would increase demand for transportation and parking at the main site while simultaneously removing parking spaces. The 2006 Berkeley Lab LRDP included an increase in the number of parking spaces on site by 500 net new spaces by 2025, from a baseline of 2,300 spaces to a cap of 2,800 spaces. New construction activities at the Lab are likely to prioritize science rather than parking. New buildings will replace existing parking areas and new construction projects are likely to include only the minimum number of spaces needed for building services. If the full scientific vision for the Lab were realized, new construction alone through 2030 could result in a net loss of 600 spaces from the onsite parking inventory.

The opportunities to increase the supply of parking on the main site are limited and relatively costly. First, there are no inexpensive or easy opportunities to create additional surface parking at the main site. Available options for modifying the roads to add space for surface parking are possible, but could be highly disruptive to operations and/or cost prohibitive. For example, changing the roads to one way would require extensive changes to Laboratory operations, and widening roadway sections is quite costly and not likely able to add significantly to parking supply. Second, potential sites for aboveground (garage) parking are limited. Berkeley Lab Director Alivisatos has committed to limiting new construction to redevelopment of existing sites such as the former Bevatron and Old Town locations. The only remaining potentially feasible brownfield site for a parking garage is in the "pit parking" location (Lot D). A garage in this location could provide up to 550 net new spaces. However, a parking garage is a relatively expensive solution. The per-commute cost of a garage parking space (assuming single vehicle occupancy), would be several times the cost of providing a commute via shuttle during peak periods (approximately $20 per day to finance the construction and maintenance of a parking space compared to $4-7 per day to avoid the need for a space by providing shuttle service). The assumptions underlying these indicative costs are presented in Attachment D. A parking garage is discussed more fully under Recommendation 15.

In general, many opportunities exist to reduce demand for parking at the main site. A primary opportunity lies in expanding the current shuttle system. While expansion of this service comes at a cost (roughly $10/vehicle mile and $4-7 per avoided space), the shuttle system is well established and well used: 25-30% of respondents to a 2014 commuter survey identified the shuttle as their primary commute mode. Also, many staff live very close to the main site: about half of all Berkeley Lab staff live within a five-mile radius of the main site, two-thirds within ten miles, and 90% within 20 miles. The

proximity of Berkeley Lab staff home addresses is presented in Figure 1 on the following page based on older data, circa 2010. A current analysis that identifies clustered counts (based on home location) of full-time equivalent commuters to the main site is included as Attachment F. In addition to the shuttle, the Lab has many alternative commute programs in place that reduce parking demand, although many are not widely used. These programs include an electronic carpool matching service through Zimride, a pre-tax set-aside program for transportation costs through Wageworks, a program that offers free rides home as backup to an alternate commute through Guaranteed Ride Home, and modest support to bicyclists through the Berkeley Lab Bicycling Coalition.

Figure 1: Berkeley Lab Staff Home Address Locations and Distances to the Main Site Circa 2010[1]



[1] Source: Fehr and Peers memo, "Lawrence Berkeley National Laboratory – Alternative Transportation Options," dated 16 March 2010. This report and others from the same consultant during that period are available at http://www2.lbl.gov/Workplace/transportation/fehrs-peers.shtml.

3 CURRENT CONDITIONS

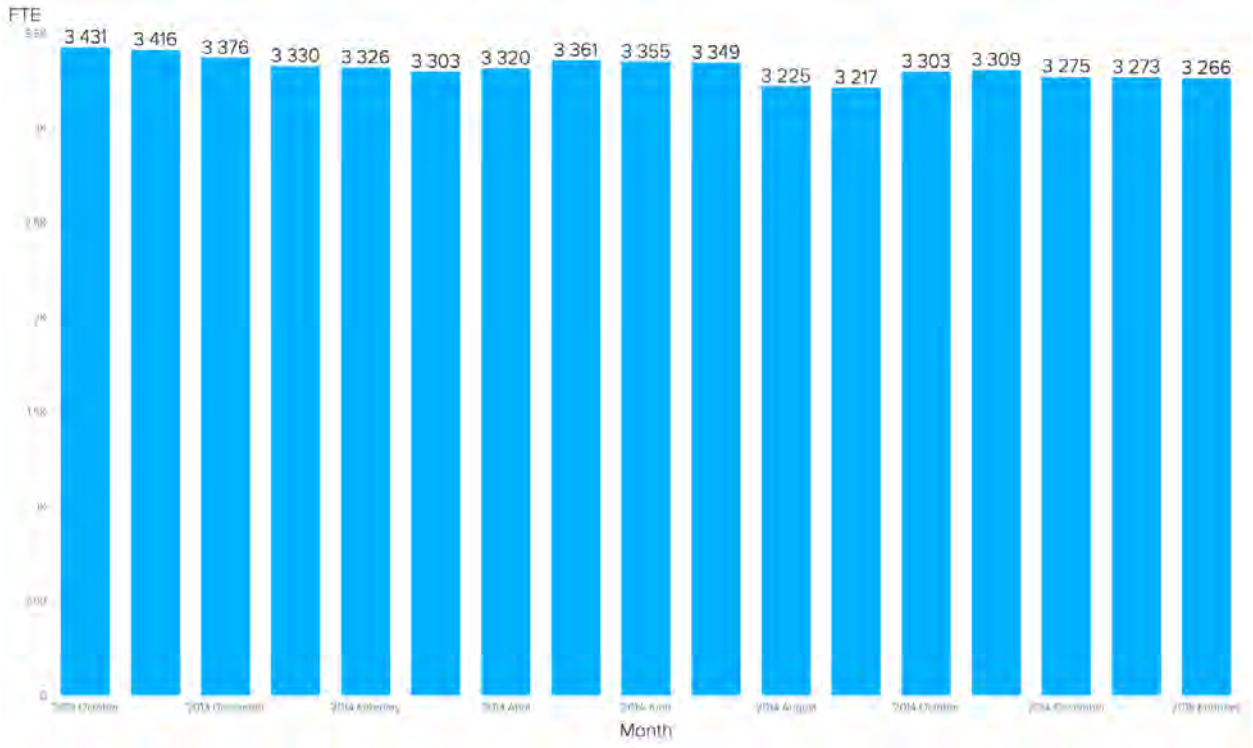
The committee identified more than eighty conditions that reflect details of the current transportation and parking situation at Berkeley Lab, summarized below. These conditions were identified based on a series of eleven presentations by subject matter experts to the committee and additional research conducted by committee members. The conditions are organized into twelve areas, in no particular order.

COMMUTER DATA

1. In its LRDP, Berkeley Lab uses adjusted daily population (ADP) to describe the population associated with the Lab on work days to inform parking and transportation demand management. ADP is calculated as the full-time equivalent employees plus 40% of registered guests, which takes into account travel, vacation, part-time employees, and the periodic nature of guests actually entering the Lab. Registered guests are tracked by Berkeley Lab Human Resources as affiliates that are on-site for more than two weeks. Examples of affiliates include facility users, scientific collaborators, students, subcontractors and independent consultants. Short-term visitors are not affiliates. Short-term visitors include those on-site for less than a week.
2. According to the LRDP, the Lab provides parking spaces for approximately 50% of the adjusted daily population on the hill.
3. Over the last several years, the count of commuters has increased. Total FTE for employees was 2,554 in FY06 and 2,944 in FY13 (15% increase). The count of affiliates over the year was 3,054 in FY06 and 3,519 in FY13 (15% increase). Note that these numbers do not correspond directly to ADP since the count of affiliates over an entire year is greater than the count of affiliates in any single month. This is because there is a "churn" of affiliates with terms expiring and starting during the fiscal year.
4. The committee chose not to use ADP as the primary metric to inform more detailed planning for transportation and parking and instead developed a separate estimate of the number of commuters at any point in time to the main site. This approach identifies "full-time equivalent commuters" to the main site, accounts for the full-time equivalence of affiliates, and excludes certain short-term facility users. The approach is detailed in Section 7, Recommendation 1. Since October 2013, the total number of full-time equivalent commuters to the hill has declined gradually by about 5%. See Figure 2, next page.
5. The count of active parking permits has increased steadily, about 9% annually since 2006.
6. A greater portion of the people eligible to receive parking permits are actually picking them up. That is, for many years, there were typically about 750 inactive permits at the end of each year that had not been picked up. Over the last two years, the number of inactive permits has dropped to about 250.
7. The Lab does not actively track daily visitors including about 50 barricade reservations, plus approximately 100 other visitors and contractors.

8. According to data circa 2010, about 48% of staff live within a 5-mile radius of LBNL, 63% within 10 miles, 86% within 20 miles. Since these data are not current, the committee has generalized these results as "about half of all Berkeley Lab staff live within a five-mile radius of the main site, two-thirds within ten miles, and 90% within 20 miles."

Figure 2: Full-time Equivalent Commuters to the Main Site



9. Commuters to the hill include a mix of full-time and part-time employees and affiliates. Based on FY13 data, 58% percent of employees and affiliates were full-time and 48% were part-time.
10. Approximately 700 employees are represented by unions. Most of them work on the hill. Changes to parking, such as charging a parking fee, are typically a negotiated item with unions.

COMMUTE SURVEY

11. The most recent commute survey was completed in August 2014. It was released by e-mail to more than 6,700 Lab employees and affiliates. 2,105 surveys were completed, for an overall response rate of roughly 31%. The representation of employees is higher – closer to 45% – since 1,795 employees and 310 affiliates responded. At the time the survey was prepared, Berkeley Lab had 4,040 full-time equivalent employees across all sites. Items 12 through 28 are based on the August 2014 commute survey.
12. 56% of respondents enter through Blackberry gate, 25% through Strawberry gate, and 19% through Grizzly gate. 49% of surveyed commuters exit through Blackberry gate, 24% through Strawberry gate, and 27% through Grizzly gate.

13. Telecommuting was reported by 3% of respondents on Monday through Thursday, 7% on Friday, and 8-9% on weekends. 57% of respondents said they could complete their work while telecommuting. 60% of those that do not telecommute are interested in doing so.
14. The heaviest three 30-minutes periods in which 54% of commuters arrive are 8:30-9, 8-8:30, and 9-9:30. Overall, the distribution is: 10% arrive before 7, 23% arrive between 7-8, 37% arrive between 8-9, 24% arrive between 9-10, 5% arrive later or during unpredictable times. The heaviest three 30-minutes periods in which 50% of commuters leave are 5-5:30, 5:30-6, and 4:30-5. Overall, the distribution is: 2% leave before 3, 10% leave between 3-4, 21% leave between 4-5, 38% leave between 5-6, 20% leave between 6 and 7, 8% leave after 7 or at unpredictable times.
15. Grizzly Peak and Hearst Avenue are the most used approaches to the Lab. Grizzly Peak would serve both the Strawberry and Grizzly gates. 18% of respondents use each approach.
16. Personal car or truck is used as a primary commute mode by 58% of respondents.
17. 25-30% of survey respondents use the shuttle. This requires some interpretation of the survey results.
    - Shuttle is reported as a primary mode by 10% of respondents.
    - BART is reported as a primary mode by 10% of respondents. We assume that all BART riders use the shuttle to complete their commute to the Lab, so this group is counted as shuttle riders.
    - Bicycle is reported as a primary mode by 10%. It is possible that some of the 10% of respondents who reported bicycling as primary mode of transport, also take the shuttle. We assume that at least half perhaps more use the shuttle (5-10% of survey respondents).
    - Therefore: 10% shuttle + 10% BART/shuttle + 5-10% bike/shuttle = 25-30% shuttle
18. 247 respondents (almost 12%) reported riding a bicycle to work. This includes 213 reporting bicycling as a primary mode of transport and 34 reporting it as a way to reach a public transit access point. The arithmetic on the survey results is as follows:
    - 213 respondents bike as a primary commute mode (10.1% x 2105 respondents =213)
    - 34 respondents bike to BART or public transportation (11.7% of respondents ride BART or other public transit. Of those, 14% use a bicycle and 59% walk to access the public transit pick-up. (14% x 11.7% x 2105 respondents = 34)
19. 4% of respondents carpool as a primary commute mode.
20. 2.5% of respondents walk as a primary commute mode.
21. About 1% of respondents ride motorcycles as a primary commute mode. Less than 1% vanpool. Less than 1% use a scooter.
22. About 1% of respondents use rail or buses as a primary commute mode.
23. Since 2011, BART use has gone down 3%, carpooling is down 4%, personal car/truck is up 4% and bicycling is up 1%.
24. The majority of respondents (59%) that take public transit walk to the transit access point. 17% drive and 14% bike to the public transit access point. 79% travel less than 2 miles to public transit.
25. More than half of respondents identify a secondary mode of transit used some days of the week.
26. 136 respondents (6%) said they plan to buy an electric vehicle (EV) within 2 years and 446 (21%) say they plan to buy an EV within 5 years. 279 of those expect that they would need charging at work to complete their commute or avoid range anxiety.

27. Wageworks is the most used commute program. It is used by 9% of respondents. Zimride is used by 38 respondents (2%). 32% said they were unaware of commuter benefits programs and 63% reported not using them.
28. Respondents identified factors that would encourage them to bike: Less steep site, more bike racks at site, updated bike racks on shuttle buses, wider uphill lanes, better road surface, more showers, shorter distance, improved safety, better weather.

PLANNING

29. While the Lab conducts transportation-planning activities in many areas (transportation demand management, environmental compliance, construction truck trip management, Bay Area Air Quality Management District regulations, traffic planning), organizational lines of responsibility for these areas are distributed across the Lab.
30. The 2006 LRDP (http://www.lbl.gov/community/planning/ldrp/) requires that the Lab maintain sufficient shuttle and shuttle/bike services, maintain the percentage of parking spaces at 50% (or reduce the percentage of parking spaces to 48%) relative to the adjusted daily population, and implement a transportation demand management (TDM) plan.
31. The 2006 LRDP Transportation Demand Management Plan identifies three phases of TDM activities: Phase 1 - Initial TDM Planning, Phase 2 - Feasibility Analyses of Additional TDM Measures, and Phase 3 - Feasibility of TDM Measures Requiring Significant Capital Expense. Phase 3 is triggered once the Lab adds 375 net parking spaces, bringing total parking spaces to 2,675. An updated traffic analysis is required at the trigger of 2,675 parking spaces or in 2017, whichever comes first.
32. When the LRDP was published, it identified 2,300 existing parking spaces serving an ADP of 4,515. The ratio of parking spaces to ADP was 0.5. Using the same ratio, the LRDP projected an increase of 500 net new parking spaces accompanying an increase in ADP of 1,010.
33. The Lab restricts construction truck trips to 96 round-trips daily, up to 8 trips per hour, up to 21,900 trips per year. The Lab follows a set protocol in cases where it may be necessary to exceed these figures.
34. Laboratory planning has identified the potential for 600 parking spaces to be removed from the parking space inventory between 2012 and 2030 associated with future development consistent with the LRDP.

PARKING SPACES AND SAFETY

35. The Lab has reached the maximum number of parking spaces that can be created on existing open ground with the current roadway and circulation configuration.
36. Parking distribution is very uneven around the main site and not matched to the building populations.
37. A detailed inventory of parking spaces as of March 2015 is included in Attachment E.
38. On-street parking accounts for 445 of approximately 2,100 parking spaces available for commuters at the Lab. Spaces are parallel, diagonal, or perpendicular to the road. Where pedestrian walkways are marked, they are between the on-street parking and the path of travel in several locations. Heightened safety awareness is required for these spaces because they

leave limited space for pedestrians, no dedicated space for bicycles, and no shoulders for emergency stops.

39. In general, Berkeley Lab roads and walking areas are very narrow. Widening roads is difficult due to the steep terrain and in many cases cost-prohibitive. Some quoted projects cost up to $2,500 per linear foot.
40. Stacked parking accounts for 112 of approximately 2,100 parking spaces available for commuters at the Lab. That is, 112 parking spaces would be lost if stacked parking areas were changed to single parking. Stacked parking refers to two cars parked one behind another, such that the second vehicle parked must be moved for the first car to exit. Stacked parking impacts safety by creating situations with poor visibility and cars that could be stuck in the event of an emergency.
41. A general lack of parking leads to "creative" parking. This includes cramped marked spaces, and use of locations that have not been marked for parking.
42. Some parking lots do not regularly fill. Examples include Lot Z, which has spaces reserved for Guest House visitors and spaces in the Chicken Creek area below building 67.

Diversity and Inclusion

43. Women and minorities are under-represented at premier parking levels. Premier parking levels include Orange Circle (Director level) and Blue Triangle (available to those with salaries above a certain threshold). See items 67 and 68 for more detail on Orange Circle and Blue Triangle permits. Approximately 88% of women have general perking permits, while 75% of men do. Approximately 88% of minorities have general perking permits, while 74% of non-minorities do.
44. The Women's Scientists and Engineers Council (WSEC) conducted Needs Assessment Surveys in 2010 and 2013. These surveys clearly identified that transportation and parking affect work-life balance and a family-friendly atmosphere at the Lab. Parking can be filled by 9 am, and some Berkeley schools do not start until 9 am. Volunteering at a child's school, meeting child care needs, and attending children's doctor appointments require parking times outside of the peak commute hours. If no parking spaces are available after the morning peak commute hours, it is difficult to attend to these family needs efficiently.
45. As of July 2014, the Lab extends temporary blue triangle parking permits to expectant mothers.
46. Current alternative commute options (shuttle, bicycling, Guaranteed Ride Home, Zimride) are difficult to use if you also need to take children to school or childcare. Telecommuting is an exception.

Shuttle

47. The Lab contracts for shuttle services. A new contract began in 2010 that significantly improved the shuttles and shuttle service. The shuttle service includes 10 shuttles (occupancy of 28 seated and 15 standing) and 4 vans (14 passengers). Four routes (Blue, Orange, Potter, Rockridge) run generally between 6:20 am and 7:30 pm. The Blue route also runs from 7:30 pm to 9:30 pm. Service is provided through the site, downtown Berkeley, to UC Campus, to offsite Oakland and Emeryville locations, and to the Downtown Berkeley and Rockridge BART stations. A van is used on the Blue route during peak times to pick up of overflow passengers.

48. A NextBus GPS system is installed on the shuttle buses that allow riders to know when the next bus will arrive, which they can view on a phone, computer, and at a digital kiosk within the bus stop enclosure. A live map of bus locations is available on line.
49. The shuttles have wireless internet service.
50. The shuttle uses 20% biodiesel (B20).
51. The shuttles complete 52,000 to 60,000 passenger trips per month.
52. The shuttles accommodate bicycles (see item 56). Sometimes the shuttles run out of bicycle carrier space during peak commute times.

Commuter Benefits

53. The Lab participates in a free Alameda County program called Guaranteed Ride Home. The program provides six free rides a year per person and is intended to provide a back-up in case a shared ride home falls through. The program is provided through Enterprise.
54. The Lab has an electronic rideshare service called Zimride. Approximately 1,808 Lab employees are registered. They can also share with about 5,700 UC Berkeley participants. The program is advertised through the new employee packet, which generates a growing pool of registrants. The Lab does not get solid data on how much Zimride is actually used. Once a car share match is made, the service does not track how many rides result.
55. The Lab has a carpool parking pass for 3 or more passengers that allows for Blue Triangle parking (see item 73). Very few permits are active.

Bicycling

56. Each shuttle holds 8 bicycles (2 up front and 6 in back). It seems likely that there is a portion of passengers unable or uncomfortable using the shuttle rear rack because of design constraints and physical strength/stature requirements. A van holds four bicycles, but the rear racks on the vans are reported to have usability issues. The shuttles move about 3,250 bicycles a month.
57. The June 2011 commuter survey indicated that about 9% of commuters bike. 5% bike all the way up the hill and 4% bike to the shuttle. The 2014 survey indicated that 247 respondents (almost 12%) reported riding a bicycle to work or another mode of transportation (see item 18).
58. Biking is encouraged at the Lab by having showers in some buildings, free bike parking, bike racks on shuttles and vans, and tools available at two on-site locations to repair bikes. Mild weather also helps riders decide to commute by bicycle.
59. Challenging biking conditions at the Lab (very hilly terrain, narrow streets without dedicated bike lanes or shoulders in most areas, lack of covered bike parking, generally poor shower facilities, overcrowded bike racks on shuttles during summer peak commute periods, and poor pavement conditions in some areas) discourage biking.
60. The Lab commissioned a "Laboratory Wide Safety Review of Transportation Infrastructure" from Creegan+D'Angelo in 2013. This report recommended (a) designating all LBNL roadways as Class III bike routes, painting "sharrows" on all roads and adding signage, (b) providing bike racks, lockers, and showers for all buildings, (c) improving visibility and creating a new uphill shoulder to allow vehicles to safely pass bicycles at "horseshoe bend" just below the Blackberry gate, and (d) removing or relocating on-street parking to allow for bike lanes. The report did not consider

programmatic changes to improve safety. The cost of the "horseshoe bend widening" project is currently being estimated and is likely to be expensive (~$1M).

61. A "Pedestrian and Bicycling Safety Assessment" was conducted by Kittelson Associates in 2014. The report is available here: http://tinyurl.com/nkqo85s.
62. The LBNL Bicycle Coalition provides modest support to bicyclists on an annual budget available to clubs at the Lab of $200.
63. Bicycling issues can be brought to the Traffic and Pedestrian Safety Committee.

Greenhouse Gases

64. Based on federal greenhouse gas reporting protocols, commuting is a significant fraction of the Lab's overall greenhouse gas emissions: 18% in FY2014. Overall, electricity use accounts for 60%, natural gas use for 12%, commuting for 18%, air travel for 9%, and other (including fleet and other business-based ground travel) for 1%.
65. The Lab has a Federal requirement to reduce Scope 3 emissions 25% from 2008 to 2025 (recently updated in March 2015). Scope 3 emissions include mostly transportation-related emissions. As of the end of FY2014, the Lab has reduced Scope 3 emissions 6% from a FY2008 baseline based on federal greenhouse gas reporting protocols. The Lab's greenhouse gas emissions attributed to commuting fluctuate and are 12% higher than the FY2008 baseline. Active transportation demand management (encouraging non-drive alone access to the Lab) is a primary mechanism to achieve the Federal Scope 3 greenhouse gas emissions reduction requirement, and reductions in commuting greenhouse gas emissions are a significant means to reduce overall greenhouse gas emissions of the Lab.

Parking Permits and Site Access

66. Parking permits are provided free to employees and affiliates in the following employee classes: affiliate, career, contractor, International Brotherhood of Electrical Workers (IBEW) apprentice, limited, postdoctoral fellow, rehired retiree, term appointment, faculty appointment, visiting researcher. Graduate student research assistants and student assistants are not currently eligible for parking privileges.
67. There are currently 61 orange circle permit holders. This permit is currently limited to Berkeley Lab Associate Laboratory Directors (ALDs), division directors, or personnel designated by the ALD of operations (Chief Operating Officer).
68. There are approximately 850 blue triangle permit holders. Eligibility is based on an annual salary threshold (as of early FY2015 $12,995/month).
69. There are currently 46 temporary blue triangle permit holders. These permits are available to some Berkeley Lab affiliates based on job classifications, pregnant employees, affiliates, contract employees, and visitors as authorized by Human Resources.
70. There are currently 2,818 general parking (yellow) permit holders.
71. Of the 2,818 general permit holders, 1,267 are temporary.

72. There are currently 217 off-hours parking permit holders. Off-hours parking permit holders are only authorized to park on site between 3 p.m. and 8 a.m. Monday through Friday, and all day on weekends and holidays.
73. There are 10 carpool permits currently issued. Carpool permits are available to carpools of three or more.
74. Government vehicles are assigned to government spaces. The parking inventory included as Attachment E identified 210 "government and special" parking spaces.
75. Berkeley Lab Security staff enforces parking regulations. Penalties are administrative in nature. They are not communicated to a police department and violators do not incur fines. UC Police may also issue traffic or parking citations (that include fines) for violations of the California Vehicle Code while on site.
76. The existing Lab Parking Policy (available at http://tinyurl.com/o8jv62k) allows for exceptions to be made at the discretion of the "Site Access Manager." There is no available policy guidance or criteria to justify exceptions.
77. Construction contractors requesting parking are typically issued a six-month temporary general parking permit.
78. There is inconsistent issuance of parking privileges for contractors due to lack of clear policy.
79. License plate recognition (LPR) systems have been partially installed but never enabled. There is no plan to do so. The system was originally designed to automate opening of gates for authorized vehicles. LPR cameras were installed at Grizzly Gate to read front and rear license plates. LPR cameras were installed to read front plates only at Blackberry Gate. There are no LPR cameras at Strawberry Gate. The systems were never put into full operation and there are outstanding operational issues that were never resolved. For example, the Blackberry Gate cameras were reportedly blinded by afternoon sun in their last configuration.

FLEET

80. As of the end of FY2014, Berkeley Lab has a total of 163 highway vehicles (sedans, vans, and trucks) in its fleet. Six of these vehicles are owned, and the remaining 157 are leased through the Government Services Administration (GSA). Berkeley Lab also owns 73 low speed electric vehicles (LSEVs).
81. LSEVs are only used on-site. They are used by Facilities staff to complete work and are purchased by divisions to enable staff to drive across the site.
82. The fleet manager monitors usage of a majority of fleet vehicles using GPS devices and chips that plug into information ports. To avoid privacy concerns, only a portion of the available tracking data is used.
83. As of the end of FY2014, about 102 fleet vehicles (43%) are fueled using E85 from a pump onsite and 74 vehicles (31%) are electric.
84. The vehicle fleet size has reduced 37% since FY2005. It is very difficult to get authorization to increase the number of fleet vehicles and it is not likely that the fleet size will increase in the foreseeable future.
85. There was an attempt to bring Zipcar (carshare) to the Lab, but Zipcar was not interested in providing services in a location not open to the general public.
86. Continuing to meet operational needs while reducing petroleum use is a challenge for the fleet program.

UNINTENDED USES OF PARKING

87. It appears that many of those parking in the "horseshoe" (Lot F) parking lot on Cyclotron Road below the Blackberry Gate do not enter the Lab, even though they have Berkeley Lab parking permits. On one morning in October 2014, 24 cars were observed parking in the lot. Drivers in 83% of those cars walked down the hill after parking. The total capacity of the lot is 29 cars.
88. The following additional unintended uses of Berkeley Lab parking have been mentioned to committee members. These uses have not been verified, and the extent to which they happen is not known, but is expected to be small.

    - There are people who routinely work on the UC Berkeley campus who have parking privileges at the Lab but not on the campus, so they routinely commute by parking at the Lab and riding the shuttle to the UC Berkeley campus.
    - There are people who presumably do not have parking privileges at the Lab who pay to park in the Botanical Garden parking lot near the Strawberry Canyon gate.
    - There are parking reservations made routinely for staff through the visitor request system. This "loop hole" allows those without parking privileges at the Lab to be issued a temporary parking permit. This takes away parking spaces for employees with parking privileges.

4 CHALLENGES

The committee identified thirteen challenges facing transportation and parking at the Lab, listed below. These challenges summarize the current conditions presented above and express the range of issues to be addressed by recommendations. High-level cost information presented in this section is based on assumptions and estimates presented in Attachment D.

1. Current transportation and parking services are challenged to adequately meet current needs during certain periods.
    - Current configurations - including on-street parking, cramped parking, and stacked parking – could pose safety risks for pedestrians and bicyclists.
    - Availability of parking in some areas is reported as insufficient at certain times.
    - While there are more spaces at the Lab than vehicles using them, the parking areas are scattered around the Lab and are not directly proportional to the occupancies of each building. There are many lots where there are not enough spaces within a short walking distance to the driver's destinations. At times, the nearest available space can be downhill and far away from the driver's destination or the nearest bus stop.
    - Shuttle service is challenged to meet peak demand, especially for bikers.
2. Parking supply options are limited, and there is no single solution that will meet expected increases in demand.
    - A parking garage alone would take at least five years to deliver, and would provide at most 540 net spaces.
    - The plans for future buildings (GPL, Flexlab, SERC, CRT, IGB) do not call for adding parking to meet the additional demand that these buildings will create.
3. Parking supply options are very expensive.
    - A parking garage provides a higher-cost solution to meet parking demand, in excess of $20/space per day to finance the cost of construction and operation.
4. Mode choices with the lowest cost and lowest environmental impact are limited by site constraints.
    - Biking all the way up the hill is an athletic commitment.
    - Walking is practically limited to three access points. There are a few smaller walking paths leading to padlocked gates at the site perimeter. Keys are not generally made available to staff for these gates.
5. Most transportation demand management solutions require providing shuttle service.
    - Public transportation generally provides service to downtown Berkeley and does not serve the lab directly.
    - Existing shuttle services provided by the Lab free to staff range in cost from $5-$12 per vehicle mile and $2-$15 per day to avoid the need for a parking space.
6. The Lab does not have a funding model for transportation and parking services that scales easily to meet longer-term demands on transportation and parking (see Attachment C).

- There is no direct source of funding for expansion of transportation and parking services. Existing expenses are recovered through a general and administrative institutional overhead charge. A mechanism for funding through user fees is not established.
- See discussion in Section 5.

7. Deliberate transportation planning is a key opportunity to achieve a Federal Scope 3 greenhouse gas emissions reduction requirement, and reductions in commuting greenhouse gas emissions are a significant means to reduce overall greenhouse gas emissions of the Lab.
    - The Lab has a Federal requirement to reduce Scope 3 emissions 25% from 2008 to 2025.
    - Commute emissions make up 18% of the Lab's reported greenhouse gas emissions (FY2014).
    - As of the end of FY2014, the Lab has reduced Scope 3 greenhouse gas emissions 6% from a FY2008 baseline; however the Lab's commute greenhouse gas emissions fluctuate and are 12% higher than in FY2008.
8. Costs and commitments to the neighboring community increase after 2,675 parking spaces are installed on the main site.
    - According to the Lab's TDM plan, Berkeley Lab will prepare an updated traffic analysis in 2017, consult with the City of Berkeley regarding that traffic study, circulate that traffic study for review by City of Berkeley staff, and consider whether further mitigation measures or modifications are required to the Long Range Development Plan.
    - The current TDM plan identifies a trigger for additional TDM activities and planning after 2,675 parking spaces are installed. This could incur additional costs for the Lab to conduct, for example, additional studies or off-site intersection improvements.
9. Current parking privileges are provided free of charge and are allocated based on employee classification or salary.
    - Marked Orange Circle and Blue Triangle parking are typically closer to buildings and are reserved for certain employee groups. Associate Lab Directors, Division Directors and other high-ranking staff receive Orange Circle permits. Other employees earning above a specific salary threshold receive Blue Triangle parking.
10. Cross-site shuttle service does not fully meet needs and is expensive per passenger served.
    - Personal vehicles and low-speed electric vehicles are used to supplement on-site shuttle service.
    - Cross-site shuttles are scheduled to provide regular service, but are often empty.
11. Construction worker parking represents a significant, fluctuating parking demand and is not actively tracked, and is therefore difficult to manage.
    - Construction workers get visitor permits and are not consistently tracked.
    - In some cases, the contracts with the construction contractors require that the Lab provide parking spaces for workers.
12. Some existing parking spaces are unnecessarily unavailable for commuting.

- Parkers at the horseshoe lot near the Blackberry gate (Lot F) may be used primarily by off-site users, presumably to avoid paying for parking at UC Berkeley.
- Other unintended uses of Laboratory parking occur, likely at a small scale that could be addressed with updated policies.

13. While the Lab conducts transportation-planning activities in many areas (for example, transportation demand management (TDM), environmental compliance, construction truck trip management, Bay Area Air Quality Management District regulations, traffic planning), the Lab does not have clear organizational lines of responsibility in many of the areas.
    - The Lab currently manages TDM activities across multiple departments.

5 Funding Approaches

As stated above (see Challenge 6), the Lab does not have a funding model for transportation and parking services that scales easily to meet longer-term demands on transportation and parking. To organize and advance discussion on this topic, the committee identified four distinct funding approaches, summarized as follows:

- Direct Funding: Direct funding includes direct allocation of funds, primarily construction or operating funds from the Department of Energy. The committee is not aware of direct funding opportunities for transportation and parking activities.
- Indirect Funding: Indirect funding is the current method of supporting transportation and parking activities. Expenses are recovered through a general and administrative (G&A) institutional overhead charge that is applied to labor (including salary, payroll, organizational burdens, and Associate Lab Director burdens), procurement burden, travel burden and recharges). Indirect funding through G&A does not allow for a specific relationship between the use or benefit of services provided and those that bear the cost. Since the Lab seeks to minimize overhead, an indirect funding approach leads to an outcome that transportation and parking services are minimized to the minimum necessary services.
- User Fee Funding: User fee funding generates revenue from a user base to provide transportation and parking services. This is the model used by all transportation and parking organizations at every University of California campus: transportation is an “auxiliary” cost center funded primarily through collection of parking fees. The committee investigated whether a user fee was feasible within the Berkeley Lab context. While there is no clear precedent for federal authority to charge a transportation-related user fee, it does appear possible that a user fee could be established in coordination with University of California policies. Further work on confirming the exact mechanism of a user fee was not within the scope of the committee activities.
- Capped Services with Indirect Funding: As an alternative to a “market-based” solution, in which parking or transportation services are priced, services can also simply be capped and distributed according to agreed-upon rules. As an example, as the Lab population grows, the number of available parking spaces could simply remain capped by the availability of indirect funding. Then eligibility for parking could be offered to staff annually according to a lottery or a set of rules. For example, permits could be offered (in order) to Associate Lab Directors, pregnant workers, carpools, and then employees and affiliates ranked according to the distance of their home to

the Lab (longer distance, higher rank). An approach of this type is followed by Bonneville Power Administration.

Any choices about funding approach would be made by Laboratory management, and are not within the scope of the committee charge. The committee's discussion of the various funding model can be summarized as follows:

- Direct funding could be requested from DOE for a parking garage but the likelihood of funding through this method is uncertain. Direct funding is not likely available for TDM activities.
- Indirect funding is a well-established approach, but it has four drawbacks: (1) funding levels are likely to remain at minimal levels rather than optimal levels for the users of transportation services, (2) the cost basis does not necessarily scale with the need for services, (3) indirect funding does not provide a specific relationship between the use or benefit of the provided service and those who bear the cost, and (4) the approach does not influence behavior that can reduce the demand for parking.
- User fee funding may be feasible, but many further details would need to be worked out and coordinated with the Berkeley Site Office and the Berkeley Laboratory Management Office in order to confirm viability. User fee funding does better align incentives, behavior, and services than do indirect funding approaches. Drawbacks are that user fees will increase expenses for staff, would be unpopular, and would require negotiation with represented employees.
- Capped services with indirect funding is a viable approach; however, committee members were less comfortable with lottery or rule-based allocation of services than with a market-based approach through user fees.

6 SOLUTION SPACE

The committee identified over 30 potential detailed solutions to transportation and parking at the Lab's main site. These solutions are captured for future consideration by those with operational responsibility for transportation and parking and to inform higher-level recommendations the committee will develop. These solutions are not intended as recommendations, which are provided in Section 7.

The solutions are categorized broadly according to cost (or in some cases complexity) and impact (which means reducing demand for parking or reducing greenhouse gas emission). Lower cost is better and higher impact is better. The categories are therefore as follows:

- Lower Cost – Higher Impact
- Lower Cost – Lower Impact
- Higher Cost – Higher Impact
- Higher Cost – Lower Impact

These solutions are provided with additional caveats:

- Beyond the categories, the order and unique ID number for each item in the following tables has no significance and does not imply a priority.
- The committee did not attempt to clearly define the boundaries between the "lower" and "higher" categories.
- Because detailed solutions will inevitably be further developed by those with operational responsibility for implementing transportation and parking solutions, the committee did not attempt to fully develop the details of each solution. Rather, these solutions are provided to indicate the range of ideas considered by the committee.
- Many of these solutions could be altered, combined, improved, or better adapted to particular circumstances. The solutions could be implemented well or less well, with a material effect on cost or impact. The committee assumes that any of these ideas would be further refined to maximize value, which would minimize cost and maximize impact.

Note that the committee retained a telecommute policy as a solution, but not one related to flexibility in work scheduling. A telecommute policy provides flexibility in the place of work and could result in lower greenhouse gas emissions and decreased demand for parking if all telework were spread evenly over a workweek. Flexibility in work scheduling can include forms of flextime or compressed work weeks. The committee did not see a need for a flextime solution that would alter the current arrangements regarding daily schedules between staff and supervisors. Typical compressed work weeks include a 4/10 schedule in which staff work 10-hour days four days a week or a 9/80 schedule in which staff typically work 9-hour days and take every other Friday off. Within the context of transportation and parking, the committee did not see significant value in further discussion of a compressed work week solution when compared to a telework policy.

A few other solutions were discussed but deemed to be not viable including several ideas related to installing a funicular (or aerial tram or gondola) and a solution related to dis-incentivizing particular populations of high-emission vehicles. These solutions are not included in the tables that follow.

Lower Cost – Higher Impact

ID	Name	Description	Notes
6	Telecommute Policy	Granting telecommuting options and requests to staff who have positions that would enable them to do their work from their homes. Agreements would be reviewed by supervisor and HR. Denials require written justification. Once approved, would get higher level divisional approval. EHS concerns and all HR concerns and protocols would have to be met.	Telecommuting would free up parking spaces and lighten the overall car driving population at any one time. Many success stories. Spread out to all 5 days of week, not just Monday and Fridays. Track the utilization and monitor freed up parking. PNNL developed a site-wide, well-supported program. Was rolled out by HR very effectively. Included Telecommuting in HR hire packages as enticement.
8	Share Hall of Science Parking (with UC Berkeley)	UC Berkeley has some under utilized inventory at the Lawrence Hall of Science, especially M-F. Maybe allow Lab employees to park there and offer shuttle to lab.	UC Berkeley currently charges employees $71/month to park at the LHS. This is a discount from a normal campus rate of $95. It is their "Hill" permit rate.
12	Use Potter Shuttle Better	Look into adding more riders. Could pick up parkers at a designated location. Could create other stops along the Potter route to bring people into the main site in the morning. Could more actively pick up passengers riding the Blue route when they have space.	Currently, the Potter shuttle is instructed to pick people up at Hearst stop, but they sometimes keep going. The intent was to pick up stragglers from the Blue Line. Expanding to other stops might help.
13	Pay for Behavior	Could reward employees that don't take permits. Could pay employees that take alternative transportation.	Could give them a coupon or some other discount / benefit. This is not necessarily low-cost, but other sites have used it as a cheaper alternative to building parking.
18	Provide Discounted BART Tickets	Provide a $ subsidy for employees to ride BART.	The discounts may encourage more to ride BART, but it means you will also have to provide discounts to those already riding BART. Right now, those who ride AC Transit or BART bear the full cost of their commute, those who drive are not bearing the cost of parking. A charge for parking with a BART subsidy should get a higher adoption rate of transit riders than a charge for parking alone. UC Berkeley provides customers a BART card, but charges the customer $10 less. The card is provided through WageWorks. WageWorks charges UC Berkeley the full amount. UC Berkeley collects the total amount less $10 from the employee through payroll deduction. Quick example: 100 employees purchase $50 of BART value each through WageWorks. WageWorks provides the employee with the $50 of value and WageWorks charges UC Berkeley the full $5,000. UC Berkeley pays the full $5,000. UC Berkeley collects payroll decuction up to $4,000 and pays the remaining $1,000.
19	Share TDM Position with UCB	Share TDM position with Berkeley campus. Might provide instant support for TDM initiatives and might provide a wider population to find carpool and ridesharing opportunities.	Participate in AC Transit, enhanced bus contract, ZimRide jointly. Could negotiate better prices.

Lower Cost – Higher Impact (continued)

ID	Name	Description	Notes
22	Eliminate Blue Triangle/New Parking Permit Hierarchy	Discontinue parking permits based on a salary threshold.	
23	Use Parking Spaces at Guest House	Parking spaces at the guest house could be used. Perhaps visitors could park there if the house has space available.	Also look at road heading to water tower and on Calvin Road.
24	Subsidize Vanpool	Use a third party to provide vanpool services. Can set up so that commuters pay all expenses, but can also subsidize.	This has been investigated previously and there are obvious clusters of commuters from more distant locations where vanpool makes more sense economically and practically. UC is preparing for a Request for Proposal for a systemwide vanpool contract. By multiple campuses participating, the cost per van should go down. Penny Menton, Ramon Zavala, Curt Lutz and Charlotte Strem are preparing the Request for Proposal. UCLA has the most vanpool experience by far – with 150+ vanpools. There is a new start-up based in Southern California (GreenCommute) who plans to offer Tesla electric vans with good range for vanpool and then provides a means to have those vehicles used as car share vehicles during the day. UC reviewers are dubious the Tesla vans could hold 7 adults comfortably.
25	Manage Construction Contractors	Confirm arrangements in contracts, enforce agreement, don't let any contractor get a temporary permit regardless of agreement.	Provide incentives / fees for number of parking spaces required by contractor. Require contractors to use car/van-pooling. Have terms in contractor's contracts that deduct fees for parking violations (e.g. can't charge directly like regular parking police). Figure out how to shuttle them from off-site parking structures to the site. Track this more carefully. We should at a minimum track the contractors and where they park.
31	Preferential 2-wheel Parking (Adjusted Annually)	In order to encourage and facilitate use of fuel- and parking-efficient 2-wheeled motor vehicles, conduct annual poll of where people with 2-wheel vehicle permits wish to park, then annually repaint whole-car-spaces near those locations to add or remove spaces that accommodate multiple 2-wheel vehicles per single-car slot.	This could be done during an open enrollment period.
4	Scooter incentives	Set up a financing program or incentivise electric scooters.	Could be combined with items 11 and 31. Example electric scooters: http://www.monstermotorscooter.com/street-electric.html
9	Provide or subsidize electric bicycles	Electric bicycles might make it more enticing for employees to ride up the hill and get from building to building within the Lab. Could incentivize bikes: turn in parking hanger, get bike.	UC Berkeley is preparing an electric bike share pilot program to be operated by City CarShare. UC Berkeley have been testing the "Recreational" version of an eBike http://www.genze.com/model/genze-e-bike/. Contact is Lauren (TDM Manager). It is just $1,500. The bike share program is more for short trips during the work day, not for commuting.
35	Charge for Visitor Parking	Charge for visitor parking with individuals or departments able to purchase parking. (This is how it is done at UCSF, for example).	However, need to provide solution for off-hill employees to visit and attend occasional meetings, we do not want to lower cohesion between the hill and off-hill employees like JGI's. Government car spaces are nice but not sufficient for this, would have to cover personal cars.
37	Valet Parking	Assisted parking	The program was used at the Lab before to increase the capacity of certain lots. It worked before.

Lower Cost – Lower Impact

ID	Name	Description	Notes
1	Bike Trailers	Increase the capacity of shuttles (vans or buses) to bring bikes up the hill. Use bike trailers used at UC Santa Cruz. Can carry 12 or 16 bikes. In Winter 2013, shuttles at UCSC carried about 230 per day up the hill to campus.	Highly popular at UCSC. http://taps.ucsc.edu/commute-options/bikes/bike-shuttles.html Larry Pageler, UCSC Transportation Director, can provide more info. Trailer is made by sportworks: http://www.sportworks.com/assets/files/2012_Transit_Rack_Product_Matrix.pdf
2	Wall-Mount Racks	Provide more wall-mounted bike racks for commuters similar to that provided in B76, B67 or the wall-mounted Dero Ultra Space Saver model	http://www.dero.com/products/ultra-space-saver/ultra-space-saver-options.html
3	Use Horseshoe Lot	Instead of using the lot for people going to the UC Berkeley campus, use for rideshare cars such as Zipcar, CityCarShar, or some other purpose. This could this be a construction contractor parking location.	Put rideshare spaces in horseshoe lot so not behind gate, could be used for off-site errands. Staff would have to sign up to be members. Relatively easy to set up and dissolve if needed. Would need good transportation from there to other places on site.
7	Alternate Bike or Pedestrian Access/Egress Points	Use Chicken Creek path or La Verada gates for pedestrian and bike access. They could also be developed as emergency exits. See map in Attachment B.	Access for pedestrians and bikes at Blackberry gate could also be improved to be more secure with physical improvements and a good technology solution.
11	Create More Two-Wheeled Parking	Are there other locations where we could establish bike/ scooter/ motorcycle parking? Spaces where cars won't fit anyway?	Low cost and would involve re-striping the spaces, could add around 20 spaces. There is still a question of whether additional spaces would generate more two-wheel commuters.
15	Free Shared Onsite E-Bikes	Free electric bicycles available for use within the Lab's campus, cross-site transport	Some bike share systems have built-in GPS locks to track bikes and thwart theft. Could be a cost effective addition for e-Bikes. Information on a combined GPS-locking product is available at http://lock8.me/tech/, unlocked using a smartphone. Bikesmakelifebetter.com specializes in designing campus bike sharing programs. Could affect both commutes and cross-Lab travel. A pilot study would be a good first start.
21	Gamify with Carbon	A certain portion of the population at the Lab could be motivated by a "low carbon" commute club membership in which the greenhouse gas emissions were actually calculated and included in our GHG inventory. The Lab could offer prizes in different categories for the most carbon saved.	A grad student at UC Berkeley has developed an iphone app that can sense how you completed your commute and calculate the greenhouse gas emissions using the accelerometer and location services. Stanford has also done competitive commute tracking – where you win prizes for reducing your commute emissions (coming to campus off peak, parking in remote lots, bike commuting etc). In their case they are trying to stay under a trip cap imposed by the County. Contact is Ramses Madou at Stanford.
30	Reclaim Spaces through Efficient Parking Design	TPSS meetings have raised comments that painted parking lines are inefficient and wasting spaces in some areas. On an ongoing basis, starting with high-priority areas, review each street/block for opportunities to add more parking with inexpensive paint.	After initial big-impact parking solution (like one-way circulation), could review different areas over time and accumulate spaces over time. Have consultant do a study.
38	HOV-2 Carpool	Expand car pool policy from 3 to 2 drivers	There are currently only 10 issued carpool permits (defined as 3). This could actually have a very large impact if combined with some other incentive. But just changing the policy with all else remaining the same would yield little impact.

Higher Cost – Higher Impact

ID	Name	Description	Notes
40	Build Parking Garage	Build parking garage in pit parking location (Lot D).	Based on the Lab-Wide Development Study (2012), a parking garage is only considered feasible in the "pit parking" location (Lot D) and would net no more than 540 spaces. The Lab-Wide Development Study identified a structure of 6 stories at 41,200 gsf each and 660 spaces. Approximately 107 spaces are estimated to be lost, taken up by the structure and access.
14	AC Transit Easy Passes	Could be given to employees or sold to them pre-tax at a reduced price. If 66% of employees live within 10 miles of the Lab, it seems likely that many of them live within walking distance of a bus stop. A potential alternative to extending the shuttle in some cases. The pricing matrix for the EasyPass is available here: http://www.actransit.org/rider-info/easypass/easypass-for-employers/getting-started/ Charge is based on every Berkeley Lab employee regardless of how broadly they are distributed.	Riding the bus is a potential stigma that folks would have to get over. Also, the bus service would need to be very reliable to make this a viable option. One bad experience and people are unlikely to try again. At UC Berkeley, they have two programs: -The EasyPass is for Faculty and Staff. They have more than 10,000 Faculty and Staff and AC Transit charges based on actual number of staff. They currently pay around $520,000 a year for the program. They currently have about 1,000 active faculty staff pass users. They pay for this two ways. They charge employees $34/month for the pass. They are not able to get enough employees to join to cover all the costs so the remainder is covered again by permit fees. This roughly reduces the cost of an AC transit pass by 1/3rd. -The Class Pass is for Berkeley Students. For this the students have taxed themselves and pay AC Transit $69/year per registered student. UC Berkeley has about 90% of the students pick up their Class Pass and they think about 20% of the total student population actively uses the pass.
16	Use Off-Site Lots	Use the parking lot of a local organization that has low weekday demand for parking (such as a church) and use their lot as a place for employees to drop off their cars and pick up the shuttle.	Would allow people to commute from home using their own car while keeping the cars out of the main campus. The organization would need to be remunerated by the Lab somehow and that cost (which would be lower than parking at the Lab onsite) may need to be passed on to the driver. The cost difference would need to be enough to incentivize not parking onsite at the Lab. Berkeley has some under-utilized, weekday space at the Lawrence Hall of Science, See #8.
20	Improve and Increase Shuttle Service	Study and implement changes to the shuttle service to encourage and accommodate greater ridership, focusing on improving the travel times and accessibility to the shuttles.	Possible ideas to study: express shuttles to Berkeley BART (either by a new service or by changing the Rockridge BART express shuttles to go to Berkeley BART instead); dedicated shuttle just between LBNL and UCB; dedicated shuttle just for guests at the Guest House (potentially freeing up spaces in Lot Z); breaking up the Blue Line into two separate lines; bringing the Orange Line further up the hill; shuffling the bus stop locations to place them in closer proximity to the building clusters with the highest occupancy (e.g. eliminating 1 of the Bevatron Lot stops, adding a stop closer to ALS, restoring the old stop near B72); using more vans to provide shuttle service through Sally's Alley, Grizzly Gate, and Chamberlain Road; using vans to shuttle people around the lab and using the buses only to go off-site; changing the onboard WiFi service to another more reliable carrier; restoring at least a portion of the after hours service lost due to budget cuts; running shuttles to underutilized parking lots (see #23); adding bike trailers (see #1) or buses with fewer seats to accommodate more bicycles

Higher Cost – Higher Impact (continued)

ID	Name	Description	Notes
28	License Plate Recognition (LPR) or Radio Frequency Identification (RFID)	Use license plate recognition, RFID tag or some other technology as part of a permitting system. One goal is to make driving a daily decision rather than a monthly or annual right. Collect data on entries and exits to laboratory. Many possible future applications--dynamic permitting, use to control access, easier/more accurate CO2 calculations, real-time lot usage, integration with electric charging spaces, etc.	Many universities have switched to RFID permits--Duke, Wayne State, etc. The Lab has partially installed LPR. Can we use/leverage existing bay-area EZTag system?
34	Create Position in Charge of Transportation and Parking	Currently parking matters are spread across many LBNL functions, yet in our review of Stanford it was raised that having a single person responsible for parking quality and emissions reductions was needed for an effective program. Create such a position, hire that person.	
36	Issue shorter term parking permits	Annual parking permits encourage driving. Issue permits more dynamically--by the day, week, or month. License plate readers at gates makes this possible. A mobile app that allows dynamic permit requests would make it easier.	This is closely related to #28. It would require some technology to implement. Could reward employees that don't take permits. On the Berkeley campus we are working with the Institute of Transportation Studies and FHWA to test the theory of breaking the annual permit cycle and allowing daily parking efficiently. We can share our results, experiment will be done by May of 2015, with report written during summer of 2015.
39	Relocate the Shipping and Receiving Bldg to an offsite location	Could give a better location for a future parking structure.	Benefits include: - Reduced heavy truck traffic through the site. - Reduced congestion - Reduced carbon emissions - Reduced road wear

Higher Cost – Lower Impact

ID	Name	Description	Notes
10	One-way circulation	Turn most two-way streets on LBNL's campus to one-way. Would allow for more ped, bike paths, and potentially streamline shuttle route(s) within campus. Perhaps consider not all roads, but just a main loop converted to one-way? Or a few main roads. Would this provide enough parking?	Ambitious. Would likely need to be implemented in stages. Lots of details would need to be worked out and there would inevitably be winners and losers. Precedent studies would be crucial. Would definitely need to ensure benefits exceed costs/inconvenience. Some of the issues that would have to be studied or otherwise taken into consideration: - Would have an adverse impact on operations and response times for emergency vehicles, to what degree is unknown; - Would not be possible at some locations (e.g. Lawrence Road between 72 & Strawberry Gate, all of Calvin Road, McMillan Road between 76 & 69), reducing its potential effectiveness; - Would likely have the most impact on Buildings 71 & 90 because there would be only one route towards and one route away from those buildings, thus could face stern opposition from the employees in those buildings; - If one of the one-way roads had to be closed for construction, landslides, etc., then traffic around the lab could be significantly disrupted. - Sally's Alley could end up getting too much traffic - Might end up actually increasing greenhouse gases.

7 RECOMMENDATIONS

Recommendations are organized into initial, core and additional recommendations.

Initial recommendations:

- Alleviate near-term pressures on parking with minimal cost and complexity.
- Inform details and timing of the implementation of core recommendations.
- Can be led by existing staff of the divisions identified without reorganization.
- Could mitigate on the order of 10 to 100 parking spaces (either through increased parking space supply or reduced demand) at low cost.
- Are not impacted significantly by whether or not core recommendations are implemented.

Core recommendations:

- Build a scalable model that improves service levels for all commuters with the potential to adequately fund transportation demand management activities at a scale necessary to enable the Laboratory scientific mission over a 15-year planning horizon.
- Are intended to be implemented as a package of measures, under the direction of a dedicated Transportation and Parking Director or similar position.
- Generally require additional staff or consolidation of responsibilities related to transportation and parking.
- May require indirect seed funding (as identified), but could be funded going forward from user fees once implemented.
- Could mitigate on the order of 100 to 1000 parking spaces in a revenue-neutral model.

Additional recommendations:

- Do not require a vehicle access fee for implementation, and could increase availability of commuter services.
- Can be scaled consistent with institutional capability and funding availability.
- Are not necessarily certain to scale sufficiently to meet demands over a 15-year planning horizon without implementation of Core Recommendations.
- Require identification of leads and confirmation of responsibilities within the current organizational structure.
- Could mitigate on the order of 10 to 100 parking spaces.

INITIAL RECOMMENDATIONS

Initial recommendations include:

1. **Maintain metrics (Facilities Division Lead)**
   Maintain quarterly tracking of available parking spaces by parking permit category compared to “full-time equivalent commuters” grouped by “parking neighborhoods.” A sample Neighborhood Parking Inventory is presented in Attachment E.

   Detail:

   a. “Full-time equivalent commuter” counts the full-time equivalent (where a person working full time is counted as 1.0 FTE) of:

- Employees and affiliates with an office assignment on the main site within the following employee classes: affiliate, career, contractor, International Brotherhood of Electrical Workers (IBEW) apprentice, limited, postdoctoral fellow, rehired retiree, term appointment, faculty appointment, visiting researcher. Note that the "contractor" employee class reflects those with contract appointments: it does not refer to construction contractors on-site as part of construction projects.

"Full-time equivalent commuter" specifically excludes:

- Affiliates using the Advanced Light Source (identified within human resources database under Organizational Codes beginning with ALUR1) since they do not represent typical commuters, are adequately served by 12 reserved parking spaces near Building 6 and parking at the Guest House (Lot Z), and are typically entered in the human resources database with appointment percentages and lengths that do not accurately represent the time they actually spend on the main site.
- Graduate student research assistants (GSRAs) and student assistants, since they are not currently eligible for parking privileges.

b. Parking neighborhoods are related to the concept of a "five-minute walk" to represent the distance that a pedestrian is willing to walk before opting to drive. On flat terrain, this typically corresponds to about one-quarter mile (1,320 feet). At the Lab, due to the hilly terrain, constrained walking paths, and current culture, the walking radius is often much shorter than one-quarter mile. Attachment E provides 11 "parking neighborhoods" proposed for tracking purposes that roughly reflect how far people typically walk from their car to a building.

c. The Neighborhood Parking Inventory breaks out parking by type: General Parking, Blue Triangle, Orange Circle, Government and Special, Timed Parking, Emergency Parking, Disabled Parking, Visitor Parking, Motorcycle Parking, Low-Speed Electric Vehicle Parking.

Discussion:

d. The committee notes that, while adjusted daily population (ADP) may be appropriate for planning under the LRDP, ADP and population metrics that do not reflect a percent appointment, metrics that exclude affiliates, or metrics that include all affiliates are not sufficient to inform near-term operational activities to track and mange demand for parking associated with employees over time. Furthermore, annual population counts can mask significant trends visible at the monthly or quarterly levels. This is generally due to the significant portion of affiliates who commute to the main site and the high "churn" rate of the affiliates in any single year. Finally, the committee concludes that metrics differentiated by geographical area of the Lab can provide an indicator of localized population impacts to parking.

e. As a check on the "full-time equivalent commuter" count: As of the end of September 2014, the "full-time equivalent commuter" count was approximately 3,217. If we multiply this by the single-occupancy percentage of 58 percent identified in the August

2014 commuter survey, we get 1,866, which is roughly equivalent to the number of parking spaces on the hill available for commuters.

2. **Confirm parking policy for contractors, visitors, and exceptions (Environment, Health, Safety Division Lead)**
   Convene a group to develop or revise and implement a contractor parking policy, a daily visitor parking reservation policy (addressing both permanently signed and barricade parking reservations), and exceptions to the parking policy. Contractors could include both construction contractors and others who work under contract. Any modification should be consistent with the existing process to approve accessibility requests. Work with Site Security to implement and track contractors and visitors.

   Detail:

   a. The group should consider prioritizing use of parking areas that may be underutilized (such as shelf parking below B67 (Lot 2), and Guest House parking in Lot Z that may be available when the hotel is not full), or sites not used by regular commuters to the main site (Horseshoe parking, Lot F).

   Discussion:

   b. The committee expects that construction contractors working on building projects and visitors represent a significant impact on parking availability that changes monthly and is not generally tracked. During the time the committee was convened, most construction contractors parked in construction staging areas adjacent to building projects, and in more remote locations such as “pit parking” (Lot D).

   c. The committee did not find clear policy regarding parking for visitors and found that some visitor reservations are reportedly made on an ongoing basis, presumably for employees who are not eligible for permit parking.

   d. The committee does not believe that exceptions do not significantly impact the availability of parking. However, according to Site Security, current policy is not sufficient to form a basis for evaluating exception requests that are currently received.

3. **Develop and implement a telecommute policy (Human Resources and Workplace Diversity Division Lead)**
   Coordinate with existing efforts and develop and implement a telecommute policy that reduces commutes evenly across a five-day workweek.

   Detail:
   a. For planning purposes, consider a goal of reducing commutes across the five-day work week of 10% by 2020. This is consistent with a goal set by the Pacific Northwest National Laboratory (PNNL) of “40% of staff teleworking one-day per week on average by 2020.”

   Discussion:

b. The committee concludes that a broadly defined and supported telecommute policy, if implemented so that telework days were spread evenly across the five-day work week, could provide an inexpensive approach to reduce parking demand and meet other employee needs.

c. PNNL established a telework program in FY2012 and fully implemented the program by FY2013. The program includes training for both workers and supervisors as well as human resources advocates who assist with every telework arrangement. About 10% of their entire lab population of 3,800-4,200 staff are not considered eligible. About 7-8% of the eligible population participates. PNNL continues to market the program and sees it as an important recruitment tool for a younger generation of workers.

4. **Reclaim parking spaces if possible (Facilities Division Lead)**
Starting with high-priority areas, review each street/block for opportunities to add more parking spaces. Consider both four-wheel and two-wheel parking.

Detail:

a. Two-wheel parking should only be added if it does not decrease the availability of four-wheel parking.

b. Review any changes to parking spaces with the Traffic and Pedestrian Safety Committee.

Discussion:

c. The committee does not expect that many more four-wheel spaces will necessarily be created through this process. However, it would be valuable to undertake a brief, organized effort to review opportunities for additional four- or two-wheel parking spaces. Furthermore, the committee envisions changes that can be accomplished at relatively low cost, primarily by painting lines. Any changes in parking spaces should also maintain or improve bicycle and pedestrian safety.

d. Facilities could look to reduce the size of some parking spaces to 8-foot wide (adequate for a compact car), which could gain a few spaces in a long row.

5. **Mitigate parking impacts for CRT based on additional survey data (Sustainable Berkeley Lab Lead, Survey and Facilities Lead, Mitigation)**
Survey all employees who will occupy CRT as soon as possible to confirm their commute characteristics and intentions. Based on survey results, identify and implement necessary actions to mitigate parking impacts from the occupancy of CRT.

Detail:

a. The survey should be designed to answer how people currently commute to the Oakland Scientific Facility, where they commute from, how they expect to commute to CRT, and what preferences they have regarding their commute.

Discussion:

b. While near term openings of SERC and GPL create local pressures on parking availability, they do not create a significant change in the site-wide balance between commuters and parking spaces. The opening of CRT is expected to have a more acute site-wide impact by adding 124 people from offsite but freeing up only 12 spaces near the project site. CRT has very limited nearby parking. The committee does not have sufficiently detailed information to recommend a strategy to mitigate parking from CRT occupancy. Survey information from CRT commuters would better inform planning for mitigating parking impacts associated with CRT occupancy.

6. **Initiate discussions about a vehicle access fee (Office of the Chief Operating Officer Lead)**
Initiate discussions between Laboratory Management, the Berkeley Site Office, and the Laboratory Management Office about a vehicle access fee at the main site to further explore and confirm feasible approaches.

   Discussion:

   a. The Berkeley Site Office and the Laboratory Management Office would be key partners in the implementation of a vehicle access fee at the main site. Their consultation is necessary to inform any implementation activities associated with a vehicle access fee.

CORE RECOMMENDATIONS

Core recommendations include:

7. **Work to implement a vehicle access fee at the main site**
Initiate a project to further investigate and implement a vehicle access fee at the main site, known hereafter as the vehicle access fee (VAF) deployment project.

   Detail:

   a. The vehicle access fee will fund activities to mitigate parking impacts through improved transportation and parking services.

   b. The committee provides the following guidance on structuring the fee:

      - Apply a fee to vehicles entering the main site.
      - Keep shuttle services free for riders.
      - Provide preferred access at a higher cost, based on the current Orange Circle permits and based on closer proximity to buildings.
      - Provide general access at graded costs based on salary range, where employees with lower salaries pay less.
      - Coordinate the timing of implementing a vehicle access fee with BSO and LMO guidance (identified through Recommendation 6), population trends on the hill (tracked under Recommendation 1), and the timing of plans to initiate environmental analysis and permitting of future buildings.

Discussion:

c. The committee concludes that a vehicle access fee at the main site provides a scalable mechanism to meet the impacts to parking planned over the next fifteen years (see Attachment C) and enable the Lab's scientific mission. A vehicle access fee is not required to address the most immediate impacts to parking through early 2016; however, the fee provides a strategy to mitigate these impacts and those associated with future construction. Proposed timing of a VAF implementation was not established by the committee and would need to be considered as part of future, proposed project activities.

d. Activities that mitigate parking impacts may include activities to increase parking supply and a wide range of activities to reduce travel (and parking) demand, known as transportation demand management.

e. A vehicle access fee would demonstrate within the public environmental planning process for future buildings that the Lab has effective mitigation strategies related to reduction of vehicle trips.

f. A vehicle access fee should be implemented to improve services for all commuters and all commute modes. It should improve services for those who drive and increase options for those who do not drive.

g. All aspects of a vehicle access fee have not been fully developed, and certain aspects may be found infeasible. The committee recommends moving forward with this activity only at the direction of Laboratory Management and subject to guidance from BSO and LMO (see Recommendation 6).

h. Please see the discussion of alternate funding approaches (Section 5).

i. The committee envisions carpools as an important exception to the vehicle access fee (see Recommendation 10).

j. The committee is recommending that Laboratory Management pursue DOE funding of a parking garage, discussed further in Recommendation 15.

9. **Establish daily access privileges instead of monthly or annual access privileges**
Deploy a vehicle access fee on a daily basis rather than associated with a monthly or annual permit using an electronic system.

Detail:

a. The committee recommends that budget be identified as part of the VAF deployment project to conduct a consultant study investigating technology options to support daily parking privileges. The study should:

- Identify technology options
- Assess the current technology infrastructure at the Lab
- Price options
- Recommend a technology approach

- Identify staffing required to operate program

Discussion:

a. A daily choice about commute mode will encourage commuters to more carefully evaluate the tradeoffs of paying a vehicle access fee and may result in lower single-vehicle driving rates. Traditional "hang tag" parking permit programs emphasize monthly or annual parking privileges. This tends to encourage driving even if the permit holder doesn't actually need to drive every day.

b. A daily vehicle access fee will require an enabling technology such as RFID tag reading or license plate recognition. Such systems are being pursued by many University transportation programs in an effort to improve services and reduce labor costs associated with maintaining and enforcing a traditional "hang tag" permit system. Berkeley Lab has only three entrances gates, which can help limit the cost of an electronic daily payment system. Berkeley Lab may also be able to make use of existing technology infrastructure:

   - The Lab already has a system that can read ID cards and open an entrance gate, but that system is not integrated to a payment system.
   - The Lab partially installed a license plate recognition system between 2010 and 2013 at Blackberry (front plates only) and Grizzly gates (front and back plates). This system was never fully commissioned and there are known operational issues that have not been resolved. For example, the Blackberry gate cameras are blinded by sun on some afternoons.

10. **Strongly incentivize carpooling**

Allow any vehicle with two or more passengers with Lab IDs to enter the main site for free.

Discussion:

a. This approach provides a very simple mechanism to encourage greater use of the existing parking spaces at the Lab. It does not require that potential carpoolers necessarily agree to carpooling in advance, and it does not require enforcement of a valid carpool beyond what can be easily done by the existing gate guards. It would encourage a range of carpooling activities including stable carpooling arrangements and causal carpooling in which commuters arrange ways to pick up commuters before entering the Lab. It does rely on gate security staff to visually inspect the Lab ID of each passenger, which is the current practice.

b. Laboratory employees and affiliates live in close proximity to the Lab and at considerable density. This suggests that there is a large potential for carpooling if strongly incentivized.

   - Roughly half of Laboratory staff live within five miles of the main site, based on 2010 data).
   - Attachment F provides clustered counts (based on home location) of full-time equivalent commuters to the main site.

11. **Fund and fill a position to provide leadership in transportation and parking**
    Hire a position (such as a Director of Transportation and Parking) to consolidate leadership on all transportation and parking issues.

    Detail:

    a. This position should be hired early enough to influence implementation details of a vehicle access fee. This position may therefore require interim funding before it could be covered under a fee base.

    Discussion:

    b. Deployment of a vehicle access fee will increase obligations of the Lab to properly manage receipt of fees and to meet transportation and parking service levels for all commuters. A single point of contact with organizational support would enable the Lab to more reliably fulfill these obligations, confirm a directed transportation and parking strategy, and coordinate across all operational divisions.

    c. As with any hiring decision, the Lab should be careful to minimize cost and maximize value. Coordination with UC Berkeley could provide opportunities to "outsource" certain transportation and parking activities and minimize administrative costs.

12. **Establish an advisory structure for transportation and parking**
    Establish an advisory committee structure that can advise the development, deployment, and management of a vehicle access fee.

    Detail:

    a. The advisory committee should be established as part of the VAF deployment project so that the committee is able to play a continuous advisory role through the development, deployment, and operational phases of the vehicle access fee.

    Discussion:

    b. Collection of a vehicle access fee will be of interest to many parties of the Lab and it is important to have a structured and transparent process for collecting input and advising transportation and parking activities.

    c. The committee recommends that the advisory committee initially be established with representation from the entire Lab (both scientific and operational) and other groups identified by these representatives. The committee should, at a minimum, coordinate with the Community Advisory Group and the City of Berkeley to ensure input from the neighboring community.

13. **Identify next steps to expand shuttle service to meet demand and to encourage reduced demand for parking**
    Prepare a phased approach to most effectively increase shuttle service.

    Detail:

    a. The committee recommends that budget be identified as part of the VAF deployment project to conduct a consultant study to identify a phased strategy for increasing shuttle service. The study should:

- Make use of home location data similar to that included in Attachment F.
- Identify additional survey data that should be collected to inform route planning.
- Identify a high-level strategy for increasing shuttle service.
- Identify a prioritized list of routes including pick-up frequencies and bus types.
- Identify service level triggers for deploying additional shuttle routes.

b. The following scope should also be considered for inclusion in the study:

- Modifications to the Potter Street Shuttle to transport passengers to the main laboratory site during rush hour
- Modifying the existing shuttle service to decouple cross-site transport from commute transport.

Discussion:

c. Shuttle service is the primary mechanism to increase non-personal vehicle commutes. The current shuttle service focuses on transport from two BART stations (Blue and Orange Downtown Berkeley Shuttles and Rockridge Shuttle) to the Lab and transport between the Lab and offsite locations in Berkeley and Emeryville (Potter Street Shuttle). Cross-site service during non-commute hours is provided by the Blue Shuttle.

14. **Adopt metrics to guide transportation and parking planning and track progress**
Adopt mode split targets, greenhouse gas emission levels, and commute service level metrics and to guide transportation and parking planning and track progress.

Detail:

a. Targets should be set by Director of Transportation and Parking consistent with federal greenhouse gas goals and the funding model for transportation and parking.

Discussion:

b. Transportation and parking services have a significant impact on the mode choices of commuters to the Lab. Mode split targets provide good high-level goals against which progress can be tracked.

c. Personal commute choices have a significant impact on greenhouse gas emissions, with employee commutes accounting for approximately 18% of the Lab's reported greenhouse gas emissions in FY2014. The Lab has a Federal requirement to reduce Scope 3 emissions 25% from 2008 to 2025. This requirement is being reviewed and will likely be made more stringent to comply with a new sustainability Executive Order 13693 issued in March 2015. Greenhouse gas reduction targets provide good high-level goals against which progress can be tracked.

d. Transportation and parking services are also intended to provide a service to all commuters. Service-level metrics for all commuter groups also provide good high-level metrics to guide transportation and parking activities.

15. **Request DOE funding of a parking garage in the pit parking location** (Office of the Chief Operating Officer Lead)

Present to DOE of the mission relevance of a parking garage to support the Berkeley Lab scientific vision and request funding.

Discussion:

d. A parking garage at the main site is only considered feasible in the "pit parking" location (Lot D) and would net approximately 550 spaces.

e. With extremely limited opportunities to increase parking supply at the main site, a parking garage represents a unique opportunity to increase parking supply.

f. A parking garage presents several risks that prevent the committee from recommending a parking garage pursued through indirect or user fee funding (see discussion in Section 5). The first three risks would be substantially mitigated through direct DOE funding. The risks include:

   - A parking garage is an expensive solution. Assuming single vehicle occupancy, the per-commute cost of a garage parking space would be several times the cost of providing a commute via shuttle during peak periods (approximately $20 per avoided space compared to $4-7 per avoided space, see Attachment D).
   - A parking garage may not be feasible for third party development. The primary reference for a third-party financed parking garage is the Maxwell Garage that was under construction in late 2014 at UC Berkeley. The business model for this garage relies heavily on event parking for sports and music events in immediately adjacent venues. These lucrative parking revenues are not available to a garage located on the Lab main site in Lot D.
   - A parking garage is a long-term commitment. For example, The University of California has a 65-year contract for Maxwell garage. This long-term commitment could potentially be undercut by technological change in the transportation sector, such as autonomous car technology.
   - A parking garage encourages driving over public transport, resulting in higher greenhouse gas emissions compared to shuttle service (5-6 times, see Attachment D).
   - A parking garage, if not offset by removal of other parking spaces on the hill, would exceed the threshold of 2,675 parking spaces identified in the LRDP, which could incur additional costs and activities for studies and mitigation efforts.

ADDITIONAL RECOMMENDATIONS

Additional recommendations include:

A. **Identify available off-site parking locations (Facilities Division Lead)**
Identify and estimate costs for off-site parking locations that could be reasonably served by shuttle service.

Discussion:

a. A summary of additional off-site parking options is included as Attachment G. Costs range from $75 to $250 per parking space per month. The lowest cost option includes

hundreds of spaces are area available for commuters at the Lawrence Hall of Science. These spaces are managed by UC Berkeley and would be available at a cost of approximately $75 per parking space per month.

B. **Support carpooling**
Modify the existing carpool permit from three passengers to two. Identify barriers associated with Zimride usage and confirm whether Zimride is sufficient as a carpool matching service.

Discussion:

a. The current carpool permit provides Blue Triangle parking and requires three passengers per vehicle. Only about 10 carpool permits are currently issued. Lowering the threshold to two per vehicle could encourage carpooling. This approach would be superseded if Recommendation 10 were implemented.

b. Zimride provides an electronic tool to match riders for carpooling, but the committee was not able to collect firm information on whether the tool is effective at lowering barrier to ride sharing. Further investigation would allow a determination of whether the Lab should rely on Zimride as its primary tool to facilitate ride sharing.

c. The data presented in Attachment F could be effective in motivating carpools beyond what is available through Zimride. The geo-referenced data could lower the barriers to carpooling by getting people interested in identifying neighbors and inviting people to opt in or out of forms of carpooling. University of California Los Angeles (UCLA) has found it effective to facilitate physical meetings of people who live near each other (coffee meetings) as a means to create carpools.

C. **Implement a vanpool program**
Implement a vanpool program though a third party and consider providing a subsidy.

Discussion:

a. Vanpool services (which cover van use and gas costs) are typically cost-competitive with driving for those living more than 10 miles from work.

b. At least two companies are capable of providing a “turn-key” vanpool services at the Lab (vRide and Enterprise). One vRide van is already used (without Laboratory support) by employees.

c. One vanpool provider indicated that Lawrence Livermore National Laboratory had four of their vanpools and that many corporate customers have 20-40 vanpools.

d. The University of California is developing a UC-wide opt-in contract with one (or more) vanpool providers that could be used by the Lab.

D. **Encourage biking**
Pursue a series of measures to encourage biking.

Detail:

a. Some ideas for measures to encourage biking include:

   - Implement recommended measures contained in the "Pedestrian and Bicycling Safety Assessment" conducted by Kittelson Associates in 2014. This report, available here: http://tinyurl.com/nkqo85s, includes a broad range of suggested TDM strategies.
   - Conduct a biker and potential biker survey to identify biking barriers and incentives.
   - Consider piloting use of bike trailers in response to survey results. See Section 6, Solution ID 1, “Bike Trailers” under “Lower Cost-Lower Impact” solutions.
   - Consider e-bike sharing program. See Section 6, Solution ID 15, “Free Shared Onsite E-bikes” under “Lower Cost-Lower Impact” solutions.
   - Improve interior and exterior bike racks as needed. See Section 6, Solution ID 2, “Wall-Mount Racks” under “Lower Cost-Lower Impact” solutions.
   - Improve shower facilities consistently across the site.
   - Consider classes to teach people how to use the bus bike racks and to help facilitate use.

Discussion:

b. Clarify the goal of any measure chosen to encourage biking. Measures may be more or less effective at:

   - Encouraging commuters to ride bikes and use a Lab shuttle for the last part of the trip
   - Encouraging bikers to ride up the hill to the main Laboratory site
   - Encouraging bikers to ride across the main site

c. The committee investigated several locked gates with paths to neighboring communities on the northwest portion of the Lab as alternate bicycle (or pedestrian) access points. In general, they would require significant investment to establish as safe and secure access points for bicycles or pedestrians. The committee did not feel that the benefits of increased access were necessarily worth the cost. These gates would be worthy of further consideration if the Laboratory were to derive additional value from these access points, for example, as part of an emergency egress plan.

d. The committee investigated a path near Chicken Creek as an alternate bicycle access route to the Lab. The path is mostly, although sometimes roughly, paved and connects Centennial Drive to the area below Building 67 through a series of switchbacks. It is identified by the orange arrow in the picture below. This route is accessed from Centennial Drive through a gate with card access managed by UC Berkeley. The lower part of the path is used by UC Berkeley as a Facilities corporation yard. There is a locked gate about midway up the route marking the Laboratory boundary. This path could serve as a much safer alternative to biking up Centennial Drive to the Strawberry Gate. The next steps for accessing feasibility would be to contact UC Berkeley and identify a

point of contact for the corporation yard and identify activities necessary to make the route safe and secure.

Figure 3: Chicken Creek Path

e. Some sites, such as the NASA Jet Propulsion Lab, have formed "grass-roots bike trains" to help lower the barriers to bike commuting. The idea is to pair up inexperienced bikers with an experienced "conductor" who can help new bikers feel comfortable on their commutes. You can listen to a National Public Radio story about this at http://tinyurl.com/n5uh6dc.

E. **Encourage public transit use**
Consider encouraging public transit use through subsidies to BART or AC Transit.

Detail:

a. Both public transit subsidy programs are used by UC Berkeley. It may be possible to pool commuters between UC Berkeley and Berkeley Lab to discount the cost of providing the subsidy.

b. At UC Berkeley, the BART subsidy works by selling BART commuter cards at a discounted price (for example, selling a $50 BART card for $40). The program is administered through Wageworks, the same provider that provides pre-tax commuter benefits at the Lab.

c. At UC Berkeley, the AC Transit subsidy for faculty and staff covers about one-third of the cost of a monthly AC Transit pass. Pricing per pass is set by AC Transit according to the total number of persons to whom the pass is offered (not the number who actually use the program). The pricing matrix is available at http://www.actransit.org/rider-info/easypass/easypass-for-employers/getting-started/.

8 ATTACHMENTS

A. COMMITTEE MEMBERSHIP LIST

The Committee on Transportation and Parking in Support of Science members:

1. Diana Attia, Co-chair, Physical Sciences
2. Elizabeth Bautista, NERSC (June through November 2014)
3. Jim Dahlgard, Facilities
4. John Elliott, Co-chair, Laboratory Directorate
5. Brian Fox, OCFO
6. Jill Fuss, Life Sciences
7. Tim Hart, Facilities
8. Robert Otillar, Joint Genome Institute
9. Jeffrey Philliber, Facilities (beginning September 2014)
10. Kory Porter, Facilities
11. Chris Stratton, Building Technology & Urban Systems
12. Charlotte Strem, University of California Office of the President
13. Brian Strock, Protective Services (June through December 2014)
14. Jeff Troutman, Advanced Light Source
15. Aaron Ward, Protective Services (beginning December 2014)
16. Seamus Wilmot, University of California Berkeley Parking and Transportation

B. Berkeley Lab Map

KEY LOCATIONS – MAP LOCATION

Advanced Light Source (Bldg. 6) — C3, C4

Bldg. 50 Auditorium — C2

Bldg. 66 Auditorium — D6

Cafeteria (Bldg. 54) — C2, C3

DOE Site Office (Bldg. 90) — A1

Energy Sciences Network (Bldg. 50B) — C2

Guest House — C3

Lab Director's Office (Bldg. 50A) — C2

Main Bus Stop (Bldg. 65) — B1

Molecular Foundry (Bldg.67) — C6

National Center for Electron Microscopy (Bldg. 72) — C6

Site Access Office (parking, badges) (Bldg. 65A) — C1

OFF-SITE LOCATIONS

Donner Lab — B5 on UC Berkeley campus map

Calvin Lab — D6 on UC Berkeley campus map

Joint BioEnergy Institute (JBEI) — Bldg. 978, 5885 Hollis St., 4th floor, Emeryville, CA

Joint Center for Artificial Photosynthesis (JCAP) — Bldg. 976, 2929 7th St., Suite 105, Berkeley, CA

DOE Joint Genome Institute (JGI) — 2800 Mitchell Dr., Walnut Creek, CA

National Energy Research Scientific Computing Center (NERSC) — Oakland Scientific Facility (OSF), 415 20th Street, Oakland CA

Office of the Chief Financial Officer (OCFO) — Bldg. 971, 6401 Hollis St., Emeryville CA

West Berkeley Biocenter (Potter St.) — Bldg. 977, 717 Potter St., Berkeley, CA

BUILDING – MAP LOCATION

Building 2 — C3
Building 4 — C4
Building 5 — C4
Building 6 — C3, C4
Building 7 — C4
Building 10A — C3
Building 14 — C4
Building 15 — C3, D3
Building 16 — C4
Building 17 — B3
Building 23 — C3
Building 25 — C4
Building 25A — C4
Building 26 — C4
Building 27 — B3
Building 31 — C5
Building 32 — C5
Building 34 — C3, D3
Building 35 — C4
Building 36 — C4
Building 37 — C4
Building 40 — C4
Building 41 — C4
Building 43 — C4
Building 44 — C4
Building 45 — C4
Building 46 — B3
Building 46A — B3
Building 47 — B3
Building 48 — C4
Building 48A — C4

BUILDING – MAP LOCATION

Building 50 — C2
Building 50A — C2
Building 50B — C2
Building 50C — C2
Building 50E — C2
Building 50F — C2
Building 52 — C4
Building 53 — C3
Building 54 — C2, C3
Building 55 — B2
Building 55A — A2
Building 56 — B2
Building 56A — B2
Building 58 — C3
Building 58A — C3
Building 60 — B2
Building 61 — C5
Building 62 — D6
Building 63 — B2
Building 64 — B2
Building 65 — C1
Building 65A — C1
Building 65B — C1
Building 66 — C6
Building 67 — C6
Building 67A — C6
Building 69 — B5

BUILDING – MAP LOCATION

Building 70 — C2
Building 70A — C2
Building 71 — A3
Building 71A — A3
Building 71B — A3
Building 72 — C6
Building 72A — C6
Building 72B — C6
Building 72C — C6
Building 73 — D7
Building 74 — B7
Building 75 — B5
Building 75A — B5
Building 75B — B5
Building 76 — B4, B5
Building 77 — B5, C5
Building 77A — C5, C6
Building 78 — B4, B5
Building 79 — C5
Building 80 — C3
Building 80A — C3
Building 81 — A2
Building 82 — A2
Building 83 — B7
Building 84 — B7
Building 85 — B7
Building 85B — B7
Building 88 — C1
Building 90 — A1

C. Increases in Demand for Parking

A list of planned increases in demand for parking over the next fifteen years associated with building construction and demolition projects. The increase in demand could be satisfied by either construction of new spaces or management of the demand for new parking through transportation demand management activities such as shuttle service.

ID	Planning Period	Time Period	Estimated Increase in Demand for Parking Spaces	Assumptions
1	Building Openings Occupancy targets: GPL and SERC early summer 2015 CRT summer 2015 through spring 2016	Present to spring 2016	40	- One parking space is provided for every two new people on-site - GPL adds 20 people from off site - SERC adds 50 people from off site - CRT adds 124 people from offsite - Between fall 2014 and spring 2015, the three projects free up parking as construction laydown areas are removed and contractors complete work. [1] - The 40 estimated spaces are needed to improve existing level of service and to relieve local parking deficits
2	Construction Projects Old Town Demolition Start: 1/2016 IGB Construction Start: 1/2018	1/2016 to 1/2019	150	- Old town takes up 50 parking spaces during construction. - IGB takes 100 parking spaces during construction. - Old Town adds 75 spaces as the demolition project ends. IGB removes 50 spaces after construction is complete.
3	IGB Occupancy Occupancy target: IGB 1/2020	1/2019 to 1/2020	200	IGB adds 200 people from offsite
4	Future Growth	1/2020 to 1/2030	1,000	- Growth is consistent with 2006 Berkeley Lab LRDP. - Parking spaces are limited to 2,800 as per LRDP (400 over current inventory of 2,400). - 600 spaces are eliminated from current inventory by future construction.

[1] In fall 2014, the staging and laydown areas were making spaces unavailable to commuters (GPL 32 spaces, SERC 30 spaces). The construction projects also introduced contractors parking outside the project boundary on the main site (SERC 35 spaces, CRT 12 spaces)

D. Cost and Greenhouse Gas Models

Assumptions used to derive indicative costs for a parking garage and shuttle services, and to estimate greenhouse gas emissions associated with each

Indicative Parking Garage Costs and Greenhouse Gas Emissions

The primary reference for parking garage costs is the Maxwell Garage that was under construction in late 2014 by a third party for UC Berkeley. The model below is intended to compare costs to build a parking garage in the "pit parking" location (Lot D). More detailed cost estimation has not been conducted.

Construction Costs	
Parking Spaces	660
Construction Cost per Space for the Reference Maxwell Garage	$40,000
Account for Addtional Complexity of the Hill Site and Contingency (40%)	$16,000
Assumed Construction Cost Per Space	$56,000
Soft Costs (15%)	$8,400
Gross Cost of Parking Structure	$42,504,000
Cost of Debt	4.5%
Debt Term - Years	30
Annual Debt Service	**$2,609,386**
Annual Operating Costs	
Utilities	$45,000
Staffing	$40,000
Maint Reserve 2%	$52,188
Subtotal Operating Expenses	**$137,188**
Total Annual Cost	**$2,746,574**
Parking Spaces Removed by the Pit Parking Structure	107
Net Parking Spaces Provided by the Pit Parking Structure	553
Total Cost per Net Space	
Annual	$4,967
Monthly - 12 months	$414
Daily - 247 days (Rounded Up to Nearest Dollar)	$21
Greenhouse Gas Emissions	
Annual Emissions (MTCO2e)	666
Annual GHG Emissions per Employee Commute (MTCO2e)	1.2

Notes:

1. Construction cost per space will vary considerably depending on type of structure. $40k per space is on the low end with a low-cost site.
2. Utilities will vary depending on type of garage: mechanical or natural ventilation.
3. Elevators, not assumed here, would add costs to utilities and maintenance.
4. Staffing includes just maintenance and enforcement, not full-time attendants.
5. GHG emissions assume 247 working days, 10 mile roundtrip commute, 18 mpg fuel efficiency, and greenhouse gas intensity factors per volume of fuel that are consistent with reporting for federal greenhouse gas inventories.

Indicative Shuttle Costs and Greenhouse Gas Emissions

The primary reference for shuttle costs is the cost of the current shuttle service provided by Berkeley Lab through a third party. From this, we derived an estimate of cost per shuttle for some sample shuttle services based on $10/vehicle mile. The greenhouse gas estimate is based on an assumed fuel efficiencies (7 mpg for a Lab bus and 11 mpg for a Lab van) and greenhouse gas intensity consistent with protocols used for federal greenhouse gas inventories. These assumptions were developed to inform committee activities are not necessarily consistent with other analyses of greenhouse gas impacts developed by Berkeley Lab.

Service	Total Annual Cost	Number of Parking Spaces Added or Avoided	Daily Cost per Space	Annual GHG Emissions (MTCO2e)	Annual GHG Emissions per Employee Commute (MTCO2e)	Notes
Existing Shuttle Services	$2,700,000	858	$13	352	0.41	25% of employees use the shuttle compared to 58% that drive. 1990 parking spaces are available on the hill. Shuttle riders estimated at 1990*25/58. We see an average of $9/vehicle mile with a range from $5 to $12. This is not an assumption.
Directed Shuttle Services For 200 Passengers at 3.5 miles	$172,900	200	$4	26	0.13	$10/vehicle mile, 7 mile round trip, Shuttle is provided every 30 minutes, Shuttle is provided 8-10 am and 4:30-6:30 pm, 10 shuttles daily, Shuttle holds up to 43 passengers
Directed Shuttle Services For 200 Passengers at 5 miles	$247,000	200	$5	37	0.18	$10/vehicle mile, 10 mile round trip, Shuttle is provided every 30 minutes, Shuttle is provided 8-10 am and 4:30-6:30 pm, 10 shuttles daily, Shuttle holds up to 43 passengers
Directed Shuttle Services For 200 Passengers at 7 miles	$345,800	200	$7	52	0.26	$10/vehicle mile, 14 mile round trip, Shuttle is provided every 30 minutes, Shuttle is provided 8-10 am and 4:30-6:30 pm, 10 shuttles daily, Shuttle holds up to 43 passengers

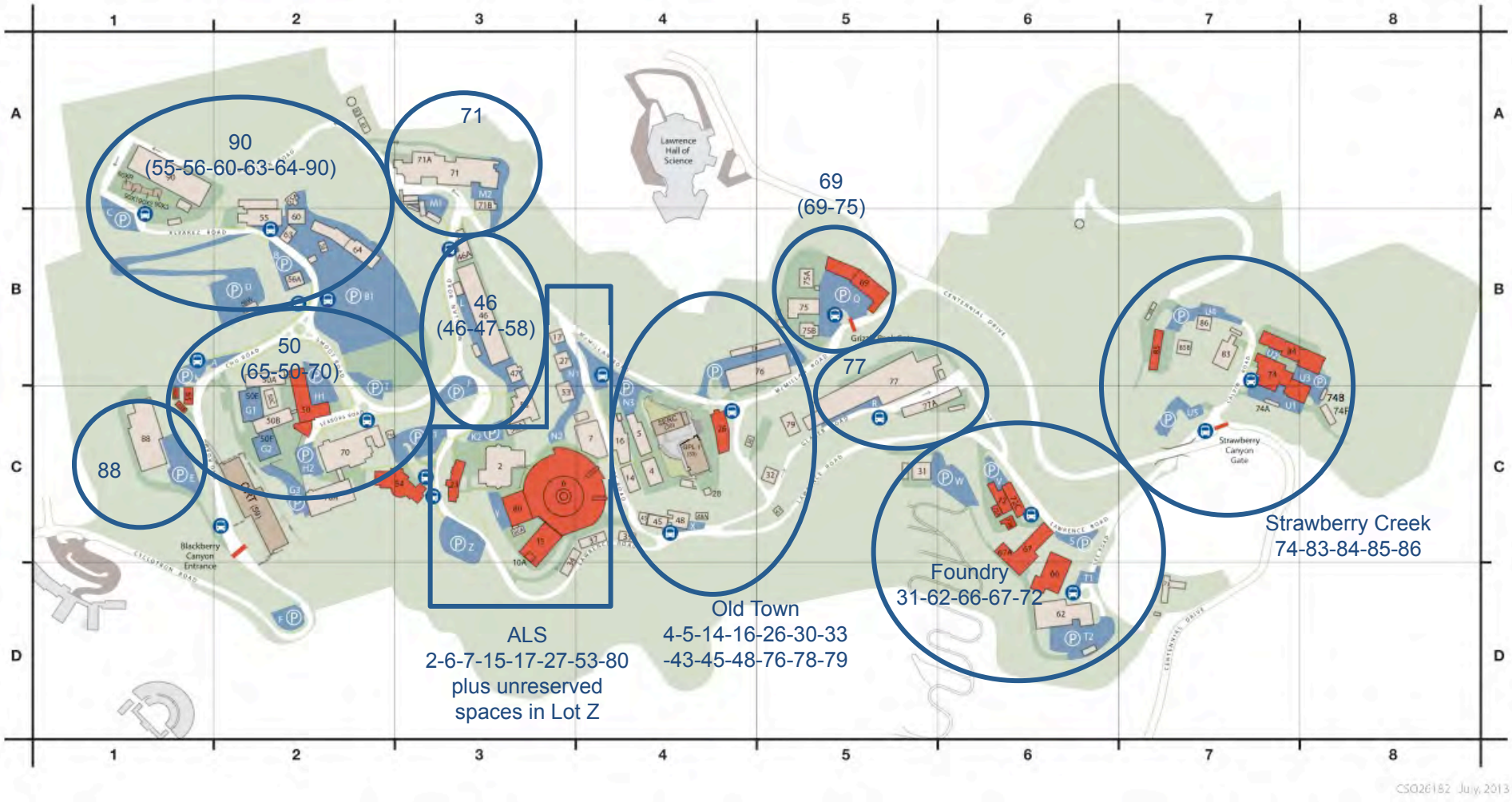
E. Neighborhood Parking Inventory

A summary of available parking spaces by parking permit category compared to the full-time equivalent commuters to the main site per building grouped by parking neighborhood, as of March 2015

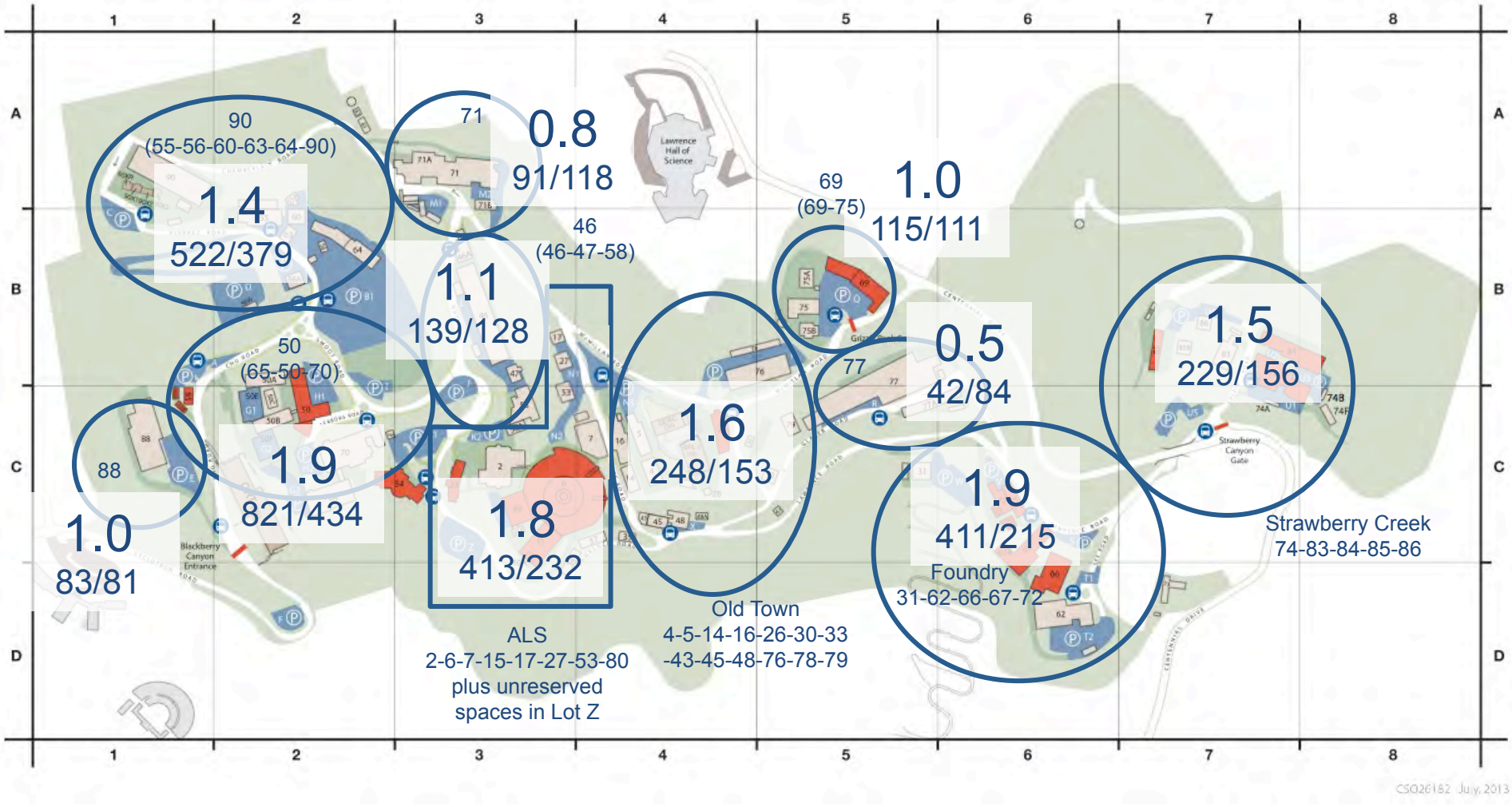
See following page.

Full-time equivalent commuter is defined in Section 7, Recommendation 1.

Neighborhood Map



Ratio of FTE Commuters to the Main Site to Number of Yellow + Blue + Orange Parking Spaces



Counts as of March 2015

SUMMARY - PARKING SPACE COUNT BY TYPE

Neighborhood	G	D	C	S	T	EM	D	V	M	EL	Total Spaces	Total G+D+C Spaces Only	FTE	Total FTE per G+D+C Spaces
88 (Lot E)	72	9	0	2	0	0	0	0	0	0	**83**	**81**	**83**	**1.0**
55-56-60-63-64-90	323	53	3	9	2	0	7	0	0	3	**400**	**379**	**522**	**1.4**
65-50-70	256	163	15	49	3	1	10	6	3	8	**514**	**434**	**821**	**1.9**
71	118	0	0	2	0	0	0	0	0	1	**121**	**118**	**91**	**0.8**
46-47-58	127	0	1	9	0	0	3	0	4	7	**151**	**128**	**139**	**1.1**
2-6-7-15-17-27-53-80	223	7	2	16	0	0	4	12	2	0	**266**	**232**	**413**	**1.8**
4-5-14-16-26-30-33-43-45-48-76-78-79	129	22	2	50	3	5	7	0	1	15	**234**	**153**	**248**	**1.6**
69-75 (Lot Q)	100	9	2	21	0	1	2	0	1	5	**141**	**111**	**115**	**1.0**
77 (Lot R)	83	1	0	7	3	0	0	0	0	3	**97**	**84**	**42**	**0.5**
31-62-66-67-72	207	3	5	38	0	0	4	0	1	0	**258**	**215**	**411**	**1.9**
74-83-84-85-86	148	5	3	7	0	0	4	0	0	2	**169**	**156**	**229**	**1.5**
TOTAL	**1786**	**272**	**33**	**210**	**11**	**7**	**41**	**18**	**12**	**44**	**2434**	**2091**	**3114**	**1.5**

KEY for PARKING SPACE TYPE

G = General Parking
D = Blue Triangle Parking
C = Orange Circle Parking
S = Government & Special Parking
T = Timed Parking
EM = Emergency Parking
D = Disabled Parking
V = Visitor Parking
M = Motorcycle Parking Area
EL = GEM & Electric Vehicle Parking

DETAILS - AGGREGATION OF PARKING SPACE COUNT BY TYPE

55-56-60-63-64-90	G	D	C	S	T	EM	D	V	M	EL
90 West (Lot C)	0	40	3	2	0	0	3	0	0	3
90 East	0	9	0	0	2	0	2	0	0	0
Blackberry Canyon (Lot D)	179	0	0	3	0	0	0	0	0	0
Chamberlain Rd	58	0	0	0	0	0	0	0	0	0
B55	30	0	0	2	0	0	0	0	0	0
"Bayview" Lot B (B56A)	21	4	0	0	0	0	1	0	0	0
Bldgs 56 & 64	35	0	0	2	0	0	1	0	0	0
TOTAL	**323**	**53**	**3**	**9**	**2**	**0**	**7**	**0**	**0**	**3**

65-50-70	G	D	C	S	T	EM	D	V	M	EL
Bevatron Lot (Lot B1)	229	0	0	22	0	0	0	0	0	0
Bldgs 50A & 50B (Lots G1 & G2)	0	23	3	7	0	0	3	0	1	4
B65 (Lot A)	0	4	0	0	0	1	2	6	0	2
Bldgs 70 & 70A (Lots G3 & H2)	0	57	1	12	0	0	2	0	1	1
B50 (Lot H1)	0	15	11	7	1	0	1	0	1	1
Cafeteria Lot (Lot K1)	6	64	0	0	2	0	2	0	0	0
Upper Bevatron Lot (Lot I)	21	0	0	1	0	0	0	0	0	0
TOTAL	**256**	**163**	**15**	**49**	**3**	**1**	**10**	**6**	**3**	**8**

2-6-7-15-17-27-53-80	G	D	C	S	T	EM	D	V	M	EL
Lawrence Rd Below 23	8	0	0	0	0	0	0	0	0	0
Guest House (Lot Z)	34	0	0	0	0	0	1	12	0	0
Lawrence Rd Below 15	55	0	0	0	0	0	0	0	0	0
B80 (Lot Y)	23	0	0	3	0	0	0	0	0	0
Bldgs 2 & 58A (Lot K2)	16	7	1	4	0	0	1	0	1	0
Bldgs 27 & 53 (Lot N1)	66	0	1	4	0	0	0	0	1	0
Lawrence Rd Below 37	6	0	0	2	0	0	0	0	0	0
Sally's Alley	6	0	0	1	0	0	0	0	0	0
B7 (Lot N2)	9	0	0	2	0	0	2	0	0	0
TOTAL	**223**	**7**	**2**	**16**	**0**	**0**	**4**	**12**	**2**	**0**

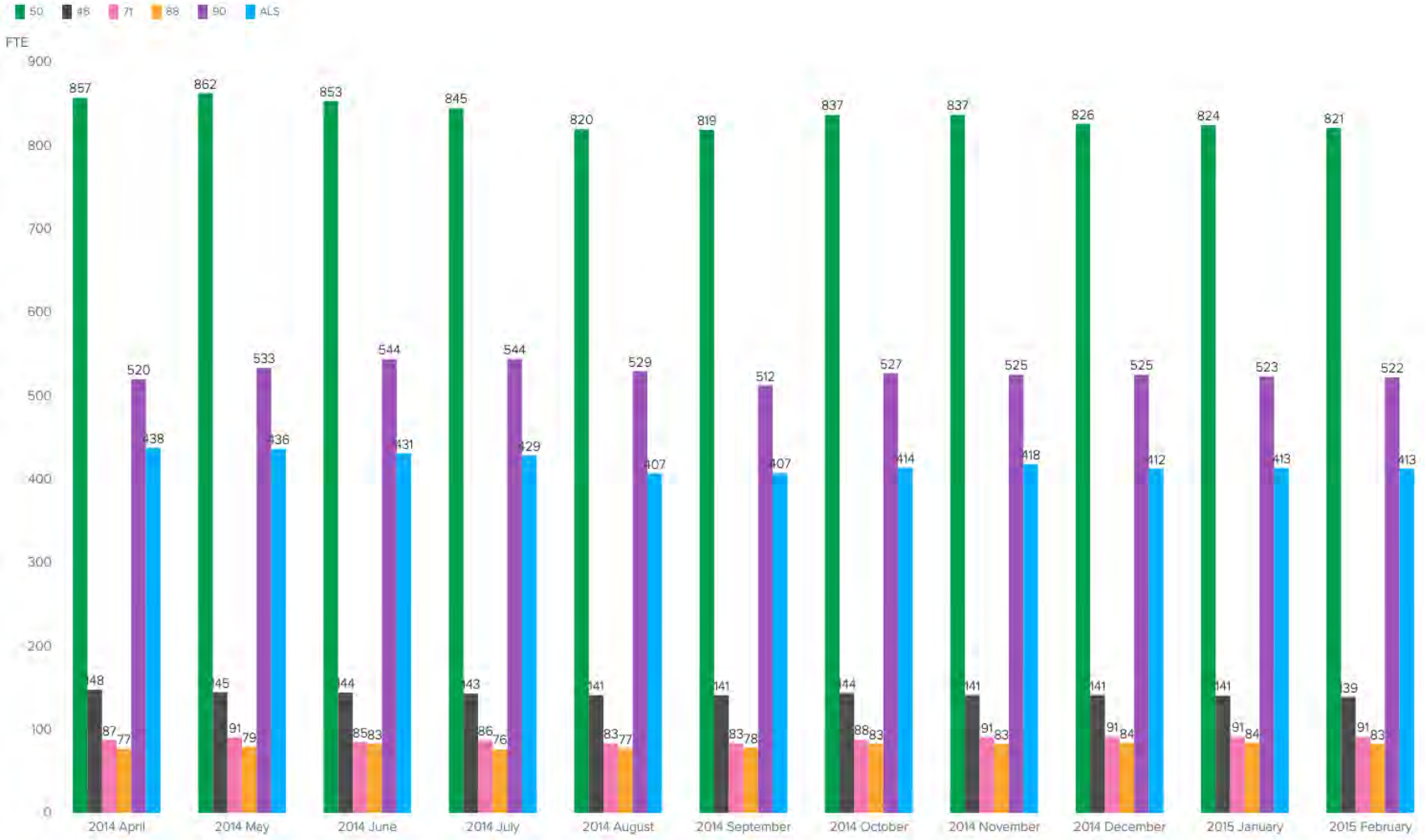
46-47-58	G	D	C	S	T	EM	D	V	M	EL
"Y" Lot (Lot J)	40	0	0	0	0	0	0	0	2	0
Lawrence Rd below B58	44	0	0	0	0	0	0	0	1	0
B46A	6	0	1	0	0	0	0	0	0	0
B47	12	0	0	0	0	0	0	0	0	0
B46 (Lot L)	25	0	0	9	0	0	3	0	1	7
TOTAL	**127**	**0**	**1**	**9**	**0**	**0**	**3**	**0**	**4**	**7**

71	G	D	C	S	T	EM	D	V	M	EL
B71 East	38	0	0	0	0	0	0	0	0	0
B71 West (Lots M1 & M2)	61	0	0	2	0	0	0	0	0	1
McMillan Rd Above B71B	19	0	0	0	0	0	0	0	0	0
TOTAL	**118**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**1**

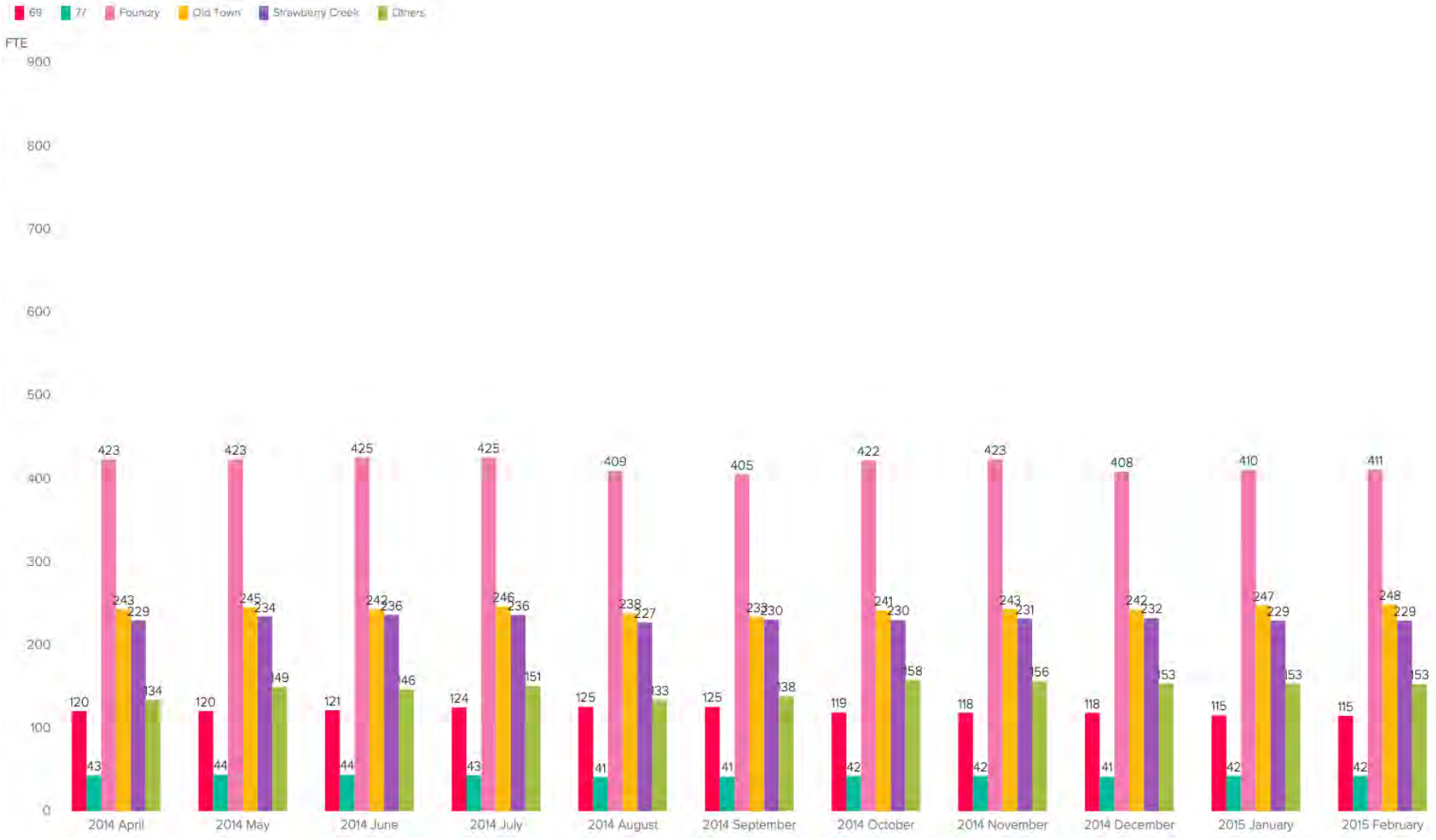
4-5-14-16-26-30-33-43-45-48-76-78-79	G	D	C	S	T	EM	D	V	M	EL
Fire Station	0	1	1	2	0	5	0	0	0	6
Bldgs 4/5/14/16 (Lots R1 & R2)	14	5	0	4	0	0	0	0	0	0
Lot N3	28	0	0	0	0	0	0	0	0	0
Lower McMillan Rd	13	0	0	0	0	0	0	0	0	0
In front of SERC	10	0	0	4	0	0	0	0	0	0
B26	6	0	0	6	3	0	4	0	0	2
Bldgs 76 & 78 (Lot P)	8	16	1	34	0	0	3	0	1	7
Behind GPL	19	0	0	0	0	0	0	0	0	0
Lawrence Rd Below B61	19	0	0	0	0	0	0	0	0	0
West Glaser Rd @ Elect.	12	0	0	0	0	0	0	0	0	0
TOTAL	**129**	**22**	**2**	**50**	**3**	**5**	**7**	**0**	**1**	**15**

31-62-66-67-72	G	D	C	S	T	EM	D	V	M	EL
B31 (Lot W)	25	0	0	18	0	0	0	0	0	0
Chicken Creek Benches	60	0	0	0	0	0	0	0	0	0
B72 (Lot V)	16	0	1	0	0	0	0	0	0	0
Below B67	22	0	0	4	0	0	0	0	0	0

FTE Commuters to the Main Site by Neighborhood Over Time – West Neighborhoods



FTE Commuters to the Main Site by Neighborhood Over Time – East Neighborhoods

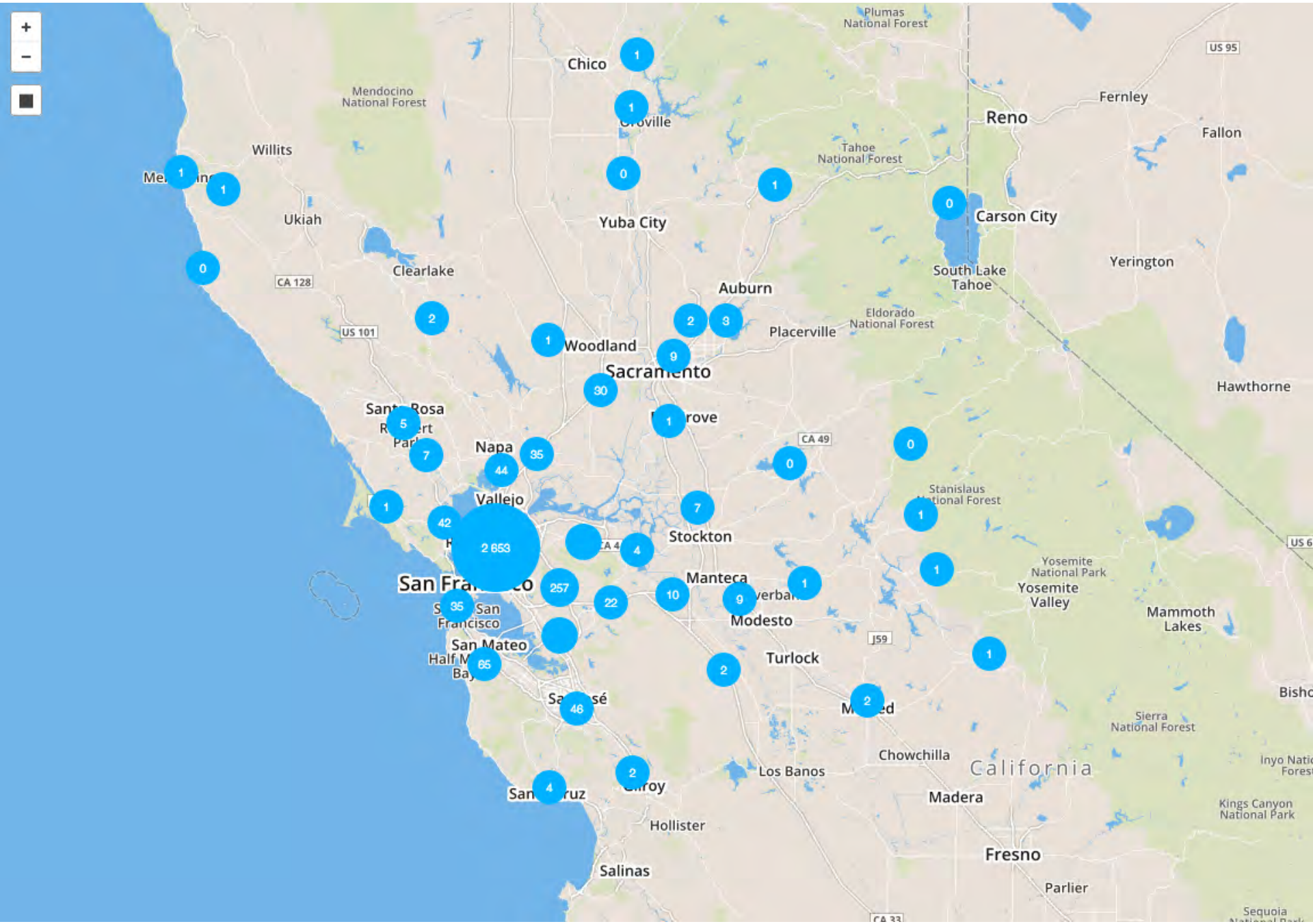


F. Commute Clusters for the Main Site

Clustered counts (based on home location) of full-time equivalent commuters to the main site

See following page.

Full-time equivalent commuter is defined in Section 7, Recommendation 1.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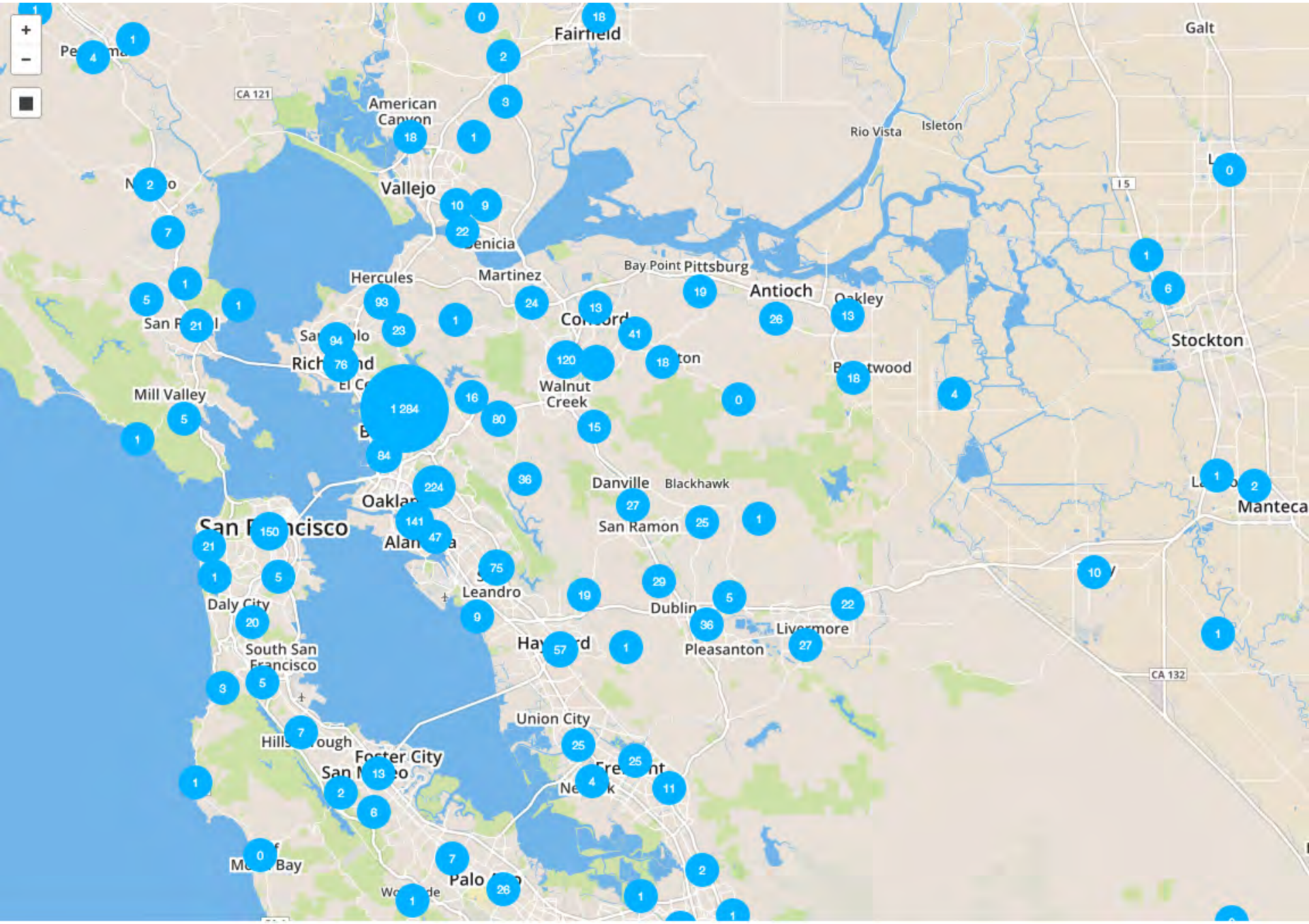
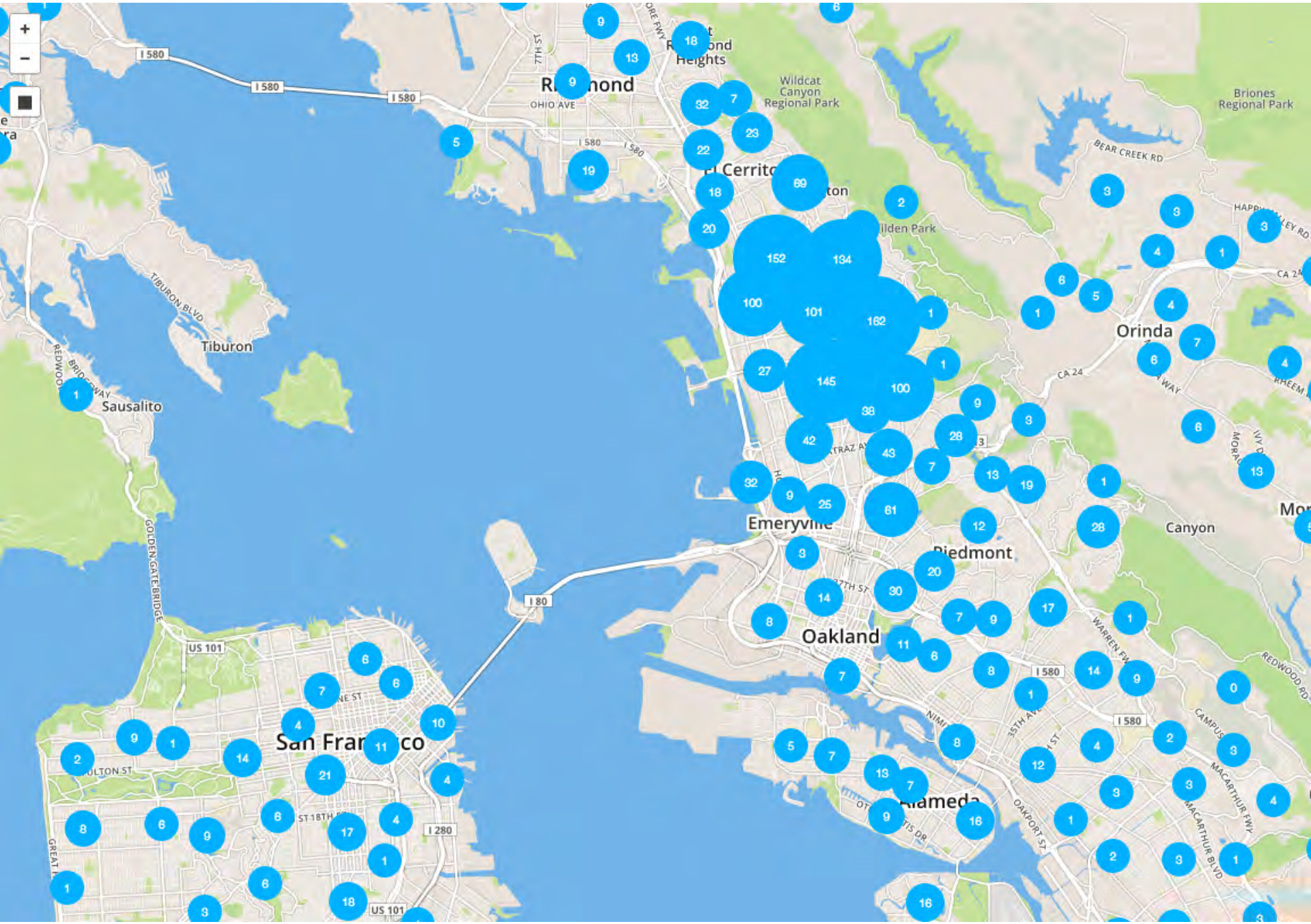
Chico
Mendocino National Forest
Willits
Ukiah
Clearlake
CA 128
US 101
Yuba City
Tahoe National Forest
Reno
Fernley
Fallon
US 95
Carson City
Yerington
South Lake Tahoe
Auburn
Placerville
Eldorado National Forest
Woodland
Sacramento
Hawthorne
Napa
Vallejo
Stockton
CA 49
Stanislaus National Forest
Manteca
Modesto
Yosemite National Park
Yosemite Valley
Mammoth Lakes
J59
Turlock
San Mateo
Sierra National Forest
Chowchilla
Los Banos
California
Madera
Kings Canyon National Park
Hollister
Fresno
Salinas
Parlier
2 653


Fairfield
Galt
American Canyon
Rio Vista
Isleton
Vallejo
Hercules
Martinez
Bay Point
Pittsburg
Antioch
Oakley
Stockton
Walnut Creek
Mill Valley
Danville
Blackhawk
San Ramon
Manteca
Daly City
Leandro
Dublin
Livermore
Pleasanton
South San Francisco
Union City
Foster City
Palo Alto
CA 121
CA 132
I 5
1 284


Richmond
El Cerrito
Wildcat Canyon Regional Park
Briones Regional Park
Tiburon
Sausalito
Orinda
Emeryville
Oakland
Piedmont
Canyon
Alameda
San Francisco
I 580
I 80
US 101
I 280
CA 24
BEAR CREEK RD
TIBURON BLVD
GOLDEN GATE BRIDGE
OHIO AVE
7TH ST
MACARTHUR BLVD
WARREN FWY
REDWOOD RD
CAMPUS DR
OAKPORT ST
152
134
100
101
162
145
69
61
43
42
38
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28
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23
22
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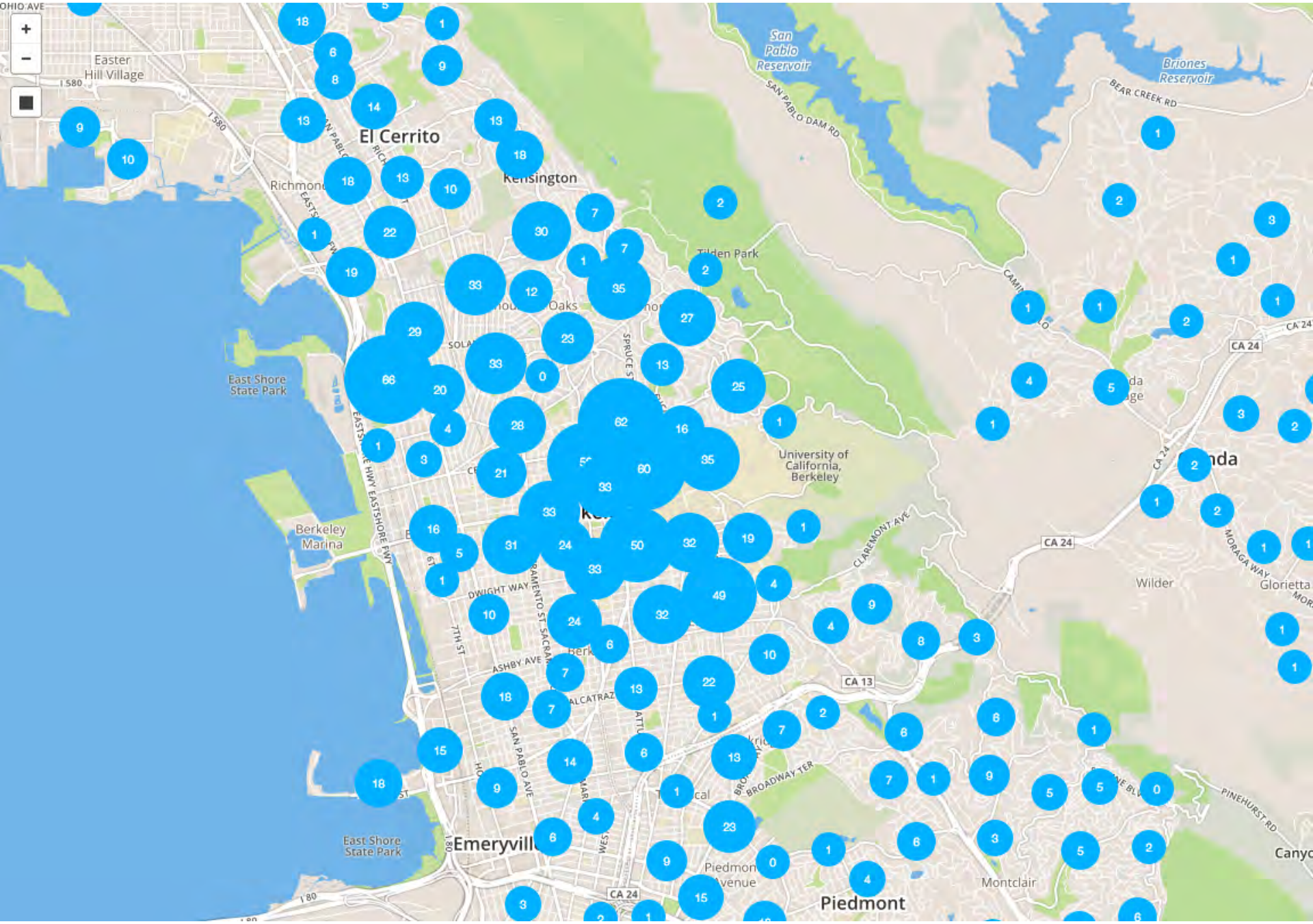
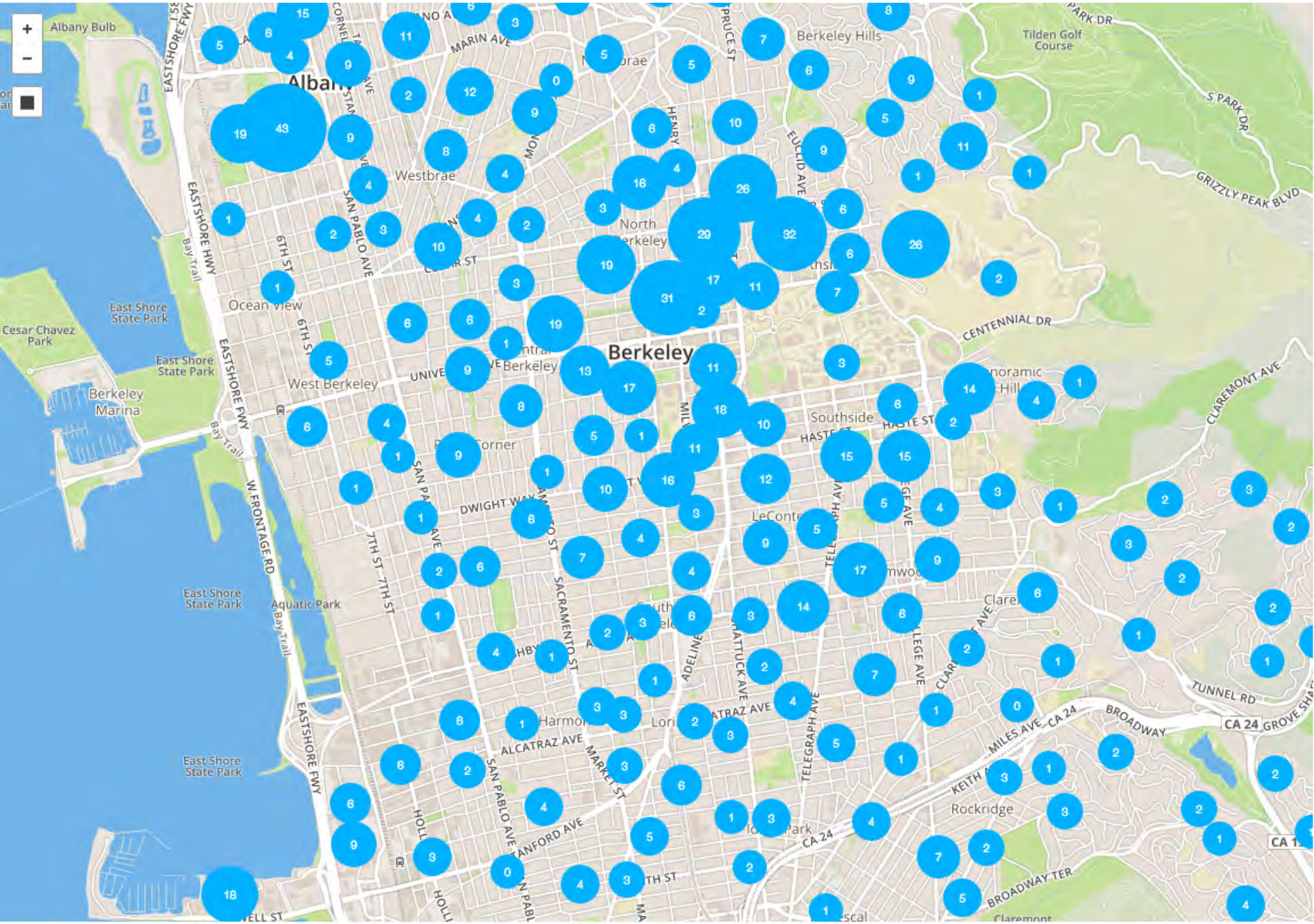
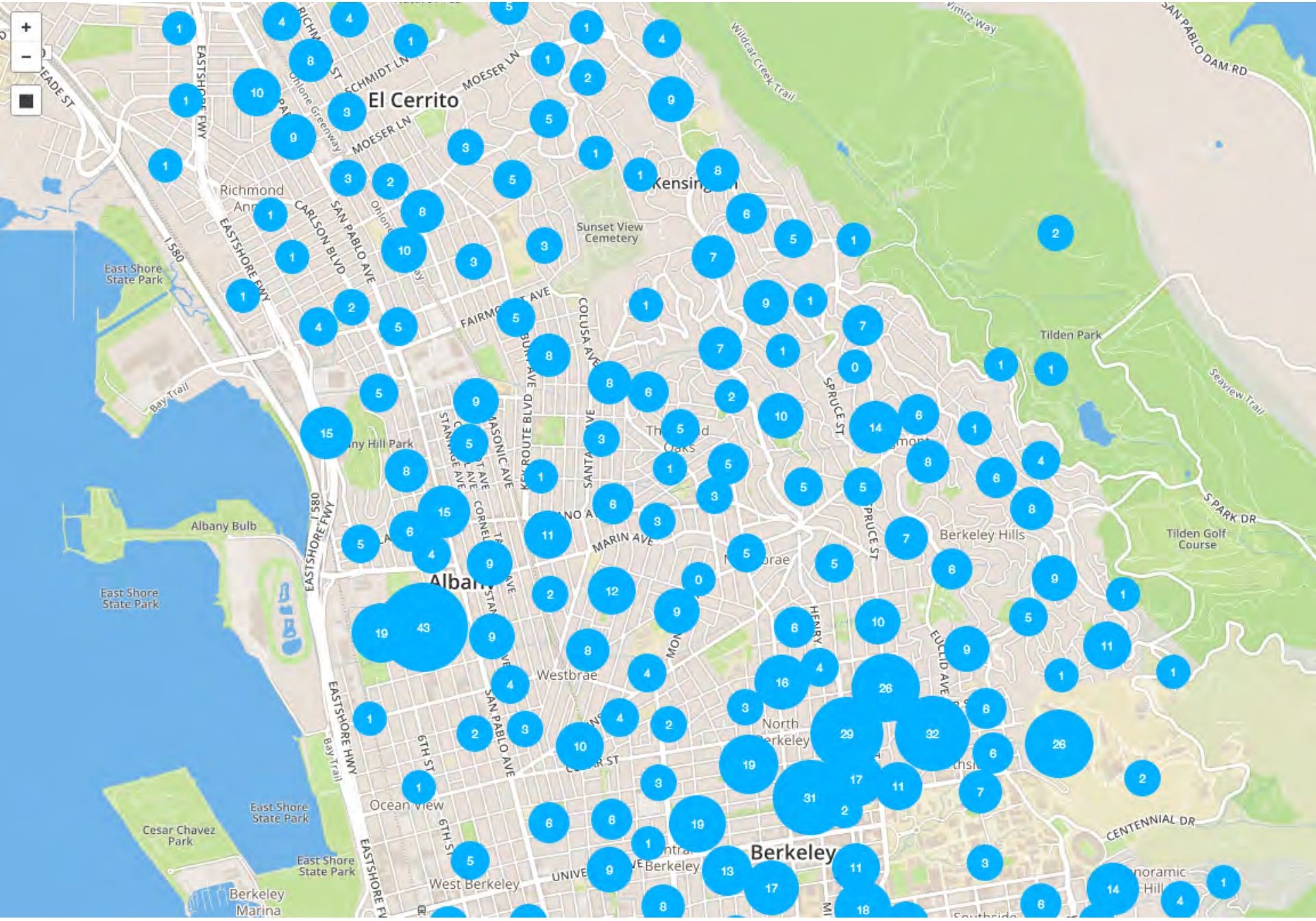
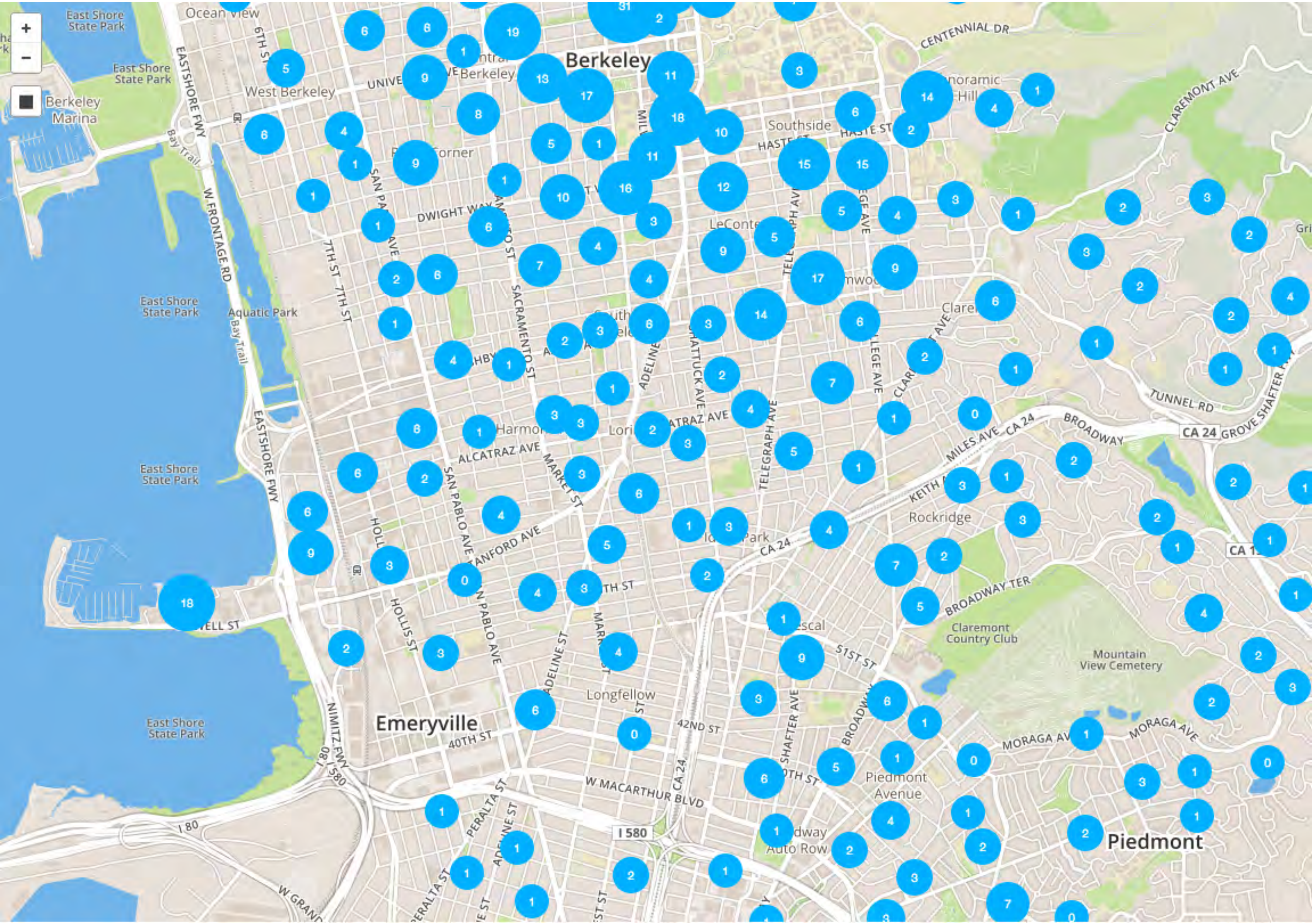
11
10


San Pablo Reservoir
Briones Reservoir
El Cerrito
Kensington
Richmond
Tilden Park
Oakes
East Shore State Park
Berkeley Marina
University of California, Berkeley
Wilder
Glorietta
Emeryville
Piedmont
Montclair
Piedmont Avenue
Easter Hill Village
SAN PABLO DAM RD
BEAR CREEK RD
CA 24
CA 13
CLAREMONT AVE
MORAGA WAY
DWIGHT WAY
ASHBY AVE
7TH ST
SAN PABLO AVE
BROADWAY TER
PINEHURST RD
I 580
I 80


Albany Bulb
Albany
Westbrae
North Berkeley
Berkeley
Berkeley Hills
Tilden Golf Course
Ocean View
West Berkeley
Southside
Rockridge
East Shore State Park
Cesar Chavez Park
Berkeley Marina
Aquatic Park
EASTSHORE HWY
EASTSHORE FWY
W FRONTAGE RD
SAN PABLO AVE
6TH ST
7TH ST
MARIN AVE
GILMAN ST
HEARST AVE
UNIVERSITY AVE
DWIGHT WAY
ASHBY AVE
ALCATRAZ AVE
TANFORD AVE
SACRAMENTO ST
MARKET ST
TELEGRAPH AVE
COLLEGE AVE
CLAREMONT AVE
CENTENNIAL DR
GRIZZLY PEAK BLVD
S PARK DR
TUNNEL RD
BROADWAY
BROADWAY TER
MILES AVE
CA 24
Bay Trail


El Cerrito
Richmond
Sunset View Cemetery
Tilden Park
Albany Bulb
Albany
Westbrae
North Berkeley
Berkeley
Berkeley Hills
Ocean View
West Berkeley
Berkeley Marina
East Shore State Park
Cesar Chavez Park
Tilden Golf Course
Wildcat Creek Trail
Seaview Trail
Bay Trail
MOESER LN
SCHMIDT LN
CARLSON BLVD
SAN PABLO AVE
EASTSHORE FWY
EASTSHORE HWY
I 580
MARIN AVE
SPRUCE ST
SAN PABLO DAM RD
CENTENNIAL DR
6TH ST
UNIVERSITY AVE


Berkeley
West Berkeley
Berkeley Marina
East Shore State Park
Ocean View
Southside
Panoramic Hill
LeConte
Rockridge
Claremont Country Club
Mountain View Cemetery
Longfellow
Emeryville
Piedmont Avenue
Piedmont
Aquatic Park
CENTENNIAL DR
CLAREMONT AVE
EASTSHORE FWY
W FRONTAGE RD
DWIGHT WAY
SACRAMENTO ST
ADELINE ST
SHATTUCK AVE
TELEGRAPH AVE
SAN PABLO AVE
ALCATRAZ AVE
MARKET ST
HOLLIS ST
STANFORD AVE
TUNNEL RD
BROADWAY
CA 24
MILES AVE
KEITH AVE
BROADWAY TER
51ST ST
MORAGA AVE
W MACARTHUR BLVD
I 580
40TH ST
42ND ST
NIMITZ FWY
PERALTA ST
SHAFTER AVE
W GRAND

G. Offsite Parking Options

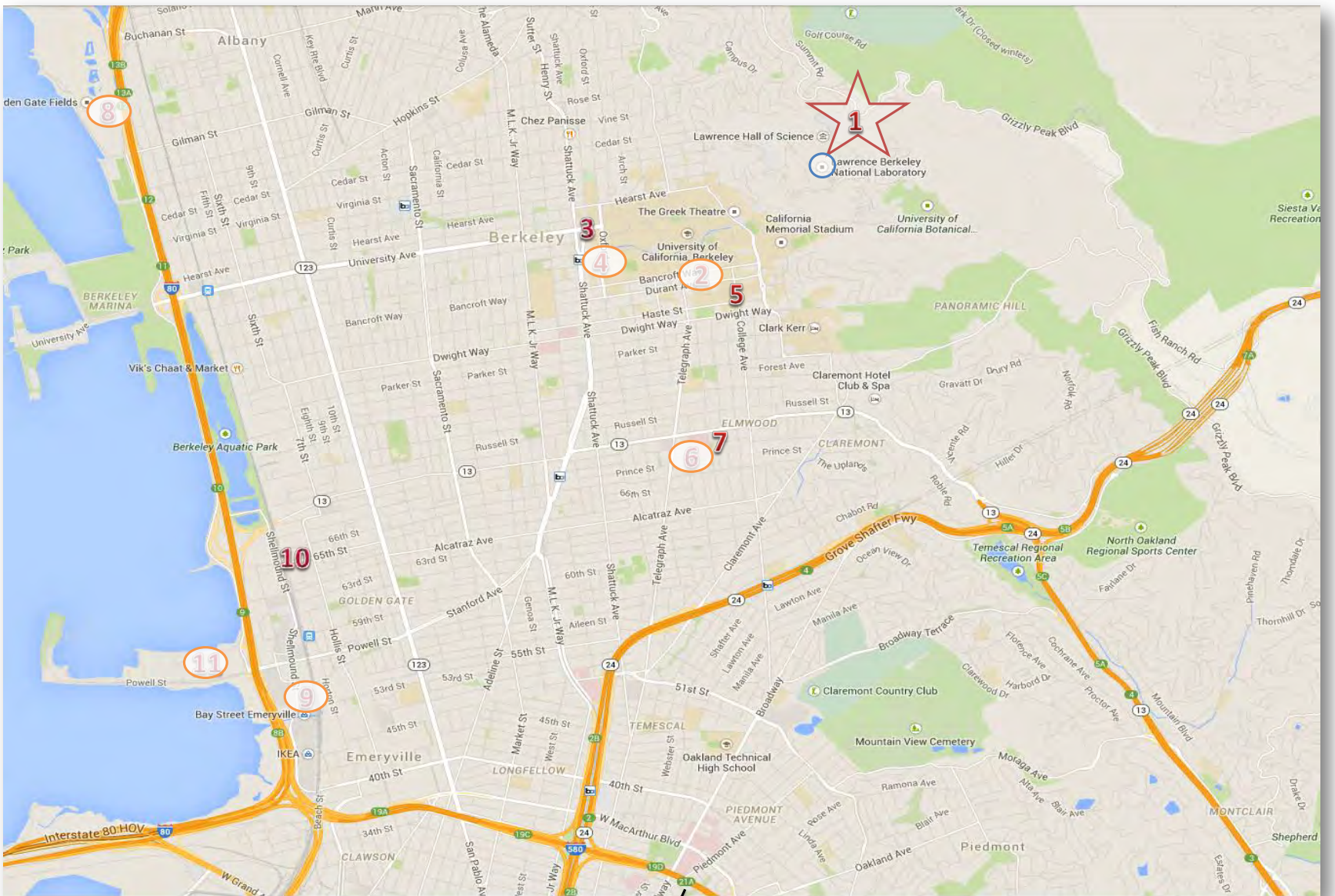
A summary of a preliminary study on offsite parking options.

See following page.

Offsite Parking Option Preliminary Study Summary

- ☐ Total of thirteen offsite parking locations were evaluated based on availability, proximity, capacity, security, and cost
- ☐ **Lawrence Hall of Science (Location #1) offers the best option in terms of proximity, space availability, security, shuttle service capability, and cost.**
- ☐ **Budget approximately $240,000 annually or $20,000 per month for leasing 100 parking spaces and providing additional shuttle service to and from Lawrence Hall of Science to LBNL**. Assumption - Rent 100 parking stalls at a unit price of $75 each or total of $7,500 per month plus monthly shuttle service of approximately $12,500. This estimate is based on MV Transportation Rockridge BART station shuttle service of $589.12 per day, 3 services in the morning and 4 services in the afternoon. Operating three shuttle bus services at a full capacity in the morning can handle total of 123 passengers. A single shuttle bus can accommodate total of forty one passengers. Need to plan additional shuttle service cost if we are expecting to exceed 123 passengers.
- ☐ Average monthly fee for a parking space ranges between $75 and $250.
- ☐ The preliminary study shows that there are limited offsite parking garages available within close proximity to the Lab.
- ☐ Certain parking garages require valet parking after certain hour in the morning due to space constraint

Location	Parking Structure Location	City	Miles from LBNL	Company	Space Availability	Capacity	Monthly fee	Notes	Contact	Phone #
1	1 Centennial Drive	Berkeley	~1.0	University of Calif.	100-150	?	$ 75	The parking lot is at the Lawrence Hall of Science	Semus Wilmot	-
2	2304 Bowditch St	Berkeley	1.1	Douglas Parking Co	0	?	-	Not available	-	510-548-2357
3	1995 University Ave	Berkeley	1.2	Ampco System Parking (ABM Parking)	120	185	$ 175	Open 6am to 10pm, on site attendant available, first come/first serve until spaces become full, then it will be valet parking	Michael Abbay / Tony Calleros	510-848-2262
4	2165 Kittredge St	Berkeley	1.2	Oxford Garage - Douglas Parking	0	?	-	Not available	-	510-548-2357
5	2061 Allston Way	Berkeley	1.3	Parking Concepts	?	610	$ 125	This is a UC Rate, Sertse (415-553-8981)	Richard Aicardi	510-981-9443
6	3010 Colby St	Berkeley	2.3	Parking Company of America	0	100	$ 130	Not available	-	510-548-3105
7	2999 Regent St	Berkeley	2.5	Unipark LLC	?	?	$ 200	Waiting for more information	Jen	510-724-0811
8	1100 Eastshore Highway	Berkeley	4.1	Golden Gate Fields	0	5,000	$ -	Not available	Ferdinand Rebusi	510-559-7384
9	5858 Hollis St	Oakland	4.2	Central Parking	0	?	-	Not available	-	510-832-7227
10	6401 Hollis St	Emeryville	4.2	Impark	100	?	$ 100	The owner is comfortable with offering 100 spaces on a Monday – Friday 6am – 7pm basis in their secure, card-controlled garage, which is currently only available to tenants. They are interested in a one year arrangement and could be extended year-to-year, based on their office tenant parking demand. Rates are to be determined but I expect that they would be in the $100/month range, per car. Shuttle service would be provided by LBNL.	Jim Hornback	415-442-8629
11	5616 Bay St	Emeryville	4.9	Impark	?	?	?	Waiting for more information	Jim Hornback	415-442-8629
12	1434 Harrison St	Oakland	6.7	LAZ Parking	50	400	$ 160	Four story indoor parking with a basement level parking. Attendant, can allocate 50 spaces on the roof for LBNL staff. M-F, 90% full. If we need 200 spaces, then they will have to assign an attendant to stack park vehicles. Group rate of $145/month.	Kevin Phan	510-882-8300
13	300 Lake Merritt Blvd	Oakland	7.6	Kaiser Center	300	300	$ 250	This is reserved, non -reserved is $205.	Andre	510-271-6113



Things to consider

1. How do we incent our people to use an offsite parking option?
2. Space requirements - What is the minimum space do we need to rent each month?
3. Time frame - When do we need the space? October 2015?
4. Lease agreement - 1 year? 3 year? 5 year?
5. Parking operating hours - When will LBNL employees use the parking space (6:30am to 6:30pm?)
6. Parking Options - Reserved? Non reserved? Valet parking required after certain hour in the morning?
7. What is the acceptable distance to and from LBNL to an offsite parking garage? 5 miles? 7 miles?
8. Shuttle Service Capability
9. Security
10. Liability